CONTRIBUTION TO THE KNOWLEDGE OF ORIENTAL PSENULUS (HYMENOPTERA, SPHECIDAE, PSENINI)

by

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Abstract

The following new species and subspecies are described and illustrated: *P. bisicatus*, W Pakistan; *suifuensis*, China; *parvidentatus*, Formosa; *nasicornis*, Celebes; *bengalensis*, India; *nietneri*, Ceylon; *pallidicollis*, Borneo; *neptunus*, Celebes; *pseudajax holtmanni*, Culion and Busuanga (Philippine Is.); *interstitialis salomonensis*, Guadalcanal, Malaita, Russell Is., Kolombangara, Vella Lavella, Bougainville (Solomon Is.); *segrex*, Celebes; *chariis*, Choiseul (Solomon Is.); *araucarius*, New Guinea; *lamprus*, Celebes; *annamensis*, Vietnam; *hoozanius*, Formosa; *ceylonicus*, Ceylon. New records of known species are given.

From various regions, particularly continental southeast Asia, Celebes and the West Pacific islands, interesting material has been received during the last few years. It contained many new species, or the opposite sex of forms described earlier after only one sex. This enabled me to obtain a better insight into the division of the genus into species-groups and their relationships.

The more our knowledge of the species of *Psenulus* increases, the stronger become grounds for the erection of a number of new subgenera. The only subgenus published so far is *Eopsenulus* Gussakovskij, 1934, for *iwatai Guss.*, whilst the genus *Nipponopsen* Yasumatsu, 1938, was erected for *anomoneurae* Yas. (syn. *Psenulus mandibularis* Tsuneki, 1959). The new subgenera should be based mostly on the already distinguished species groups, or on combinations thereof. I hope to discuss this question in a future paper, after a study of the African and New World *Psenulus*.

I express my gratitude to the institutions and entomologists who have sent me material. Their names are listed below together with the abbreviations as used in the present paper.

BISH — Bernice P. Bishop Museum, Honolulu
BM — British Museum (Natural History), London
BPIM — Bureau of Plant Industry, Manila
CAS — California Academy of Sciences, San Francisco
CNC — Entomological Research Institute of the Canadian Department of Agriculture, Ottawa
HUA — Hyogo University of Agriculture, Sasayama
Coll. Krombein — Dr. Karl V. Krombein, Washington, D.C.
MCG — Museo Civico di Storia Naturale, Genoa
ML — Rijksmuseum van Natuurlijke Historie, Leiden
OUM — University Museum, Oxford
Coll. Pagden — Mr. H. T. Pagden, Penang, Malaya

Coll. Roche — Mr. C. G. Roche, Singapore
Coll. Townes — Dr. Henry K. Townes, Ann Arbor, U.S.A.
UDE — University of Delhi, Department of Entomology, Delhi
USNM — National Museum of Natural History, Smithsonian Institution, Washington, D.C. (formerly United States National Museum)
ZMB — Museum für Naturkunde der Humboldt-Universität, Berlin

Group of *Psenulus fuscipennis*

Psenulus bisicatus spec. nov.

Female. — Black; palpi light brown; last 7 or 8 segments of antennae reddish-brown below; legs dark brown; foreside of fore tibiae, anterior tarsi, mid tarsi and ends of tarsal segments of hind legs light brown; base of hind tibiae slightly paler than rest of hind tibiae. Apical spines of fore legs light brown, of mid and hind legs whitish. Veins of wings dark brown.

Interantennal carina raised and very broad, nearly twice as broad as diameter of ocelli, lozenge-shaped, excavate and with very fine sculpture. The lateral carinae of this broadened part do not fuse below, but are parallel for a short distance, ending in transverse carina below antennae. This carina arched in frontal view, with an angle of slightly more than 90 degrees. Below this carina a smooth and shining triangle with a few large punctures, remainder of face and clypeus with dense and fine puncturation, without distinct interspaces. Anterior margin of clypeus with two long triangular teeth; distance between these teeth as long as depth of the rounded emargination (Fig. 1). Anterior margin of labrum with two small shining teeth. Frons distinctly and densely punctate, interspaces shining, punctures with tendency to oblique striation. Vertex sparsely punctate, smooth. Antennae short, clavate, third segment about one and a half times as long as broad at apex, segments 8—11 about as long as broad, 12th segment about one and a half times as long as broad at base.

Prescutal sutures visible only on anterior half of scutum. Surface of scutum shining, finely punctate, interspaces on the whole a few times larger than punctures. Scutellum very shining, almost impunctate. Enclosed area of propodeum depressed, narrow, with distinct longitudinal oblique carinae, median area broader than long, with median longitudinal carina. Upper part of posterior side of propodeum smooth and shining, lower third part with minute, hair-bearing punctures. Median longitudinal sulcus of propodeum broad and shining, ending before apex, with a few transverse carinae divided over the whole length. Sides of propodeum with fine oblique striation. Mesopleura with sparse and fine puncturation, a few indistinct transverse striae. Anterior oblique suture and its widened upper part with distinct transverse carinae. Legs normal. First recurrent vein of fore wings ending just in second submarginal cell, second recurrent vein ending well in third submarginal cell (distance slightly more than one fourth of base of third cell). Petiole not reaching as far as apex of hind femur, dorsally with shallow groove which is widened at base; rounded below. Gaster finely punctate. Lateral carinae of pygidial area about one third of length of last tergite in normal situation, apex rounded, surface dull (Fig. 2). Second gastral sternite with a distinct semi-elliptic depression.

Face below transverse carina silvery pubescent, pubescence of clypeus appressed only laterally. Pubescence of thorax and gaster whitish and of normal density, hind margin of fourth and fifth gastral sternites with a fringe of long white hairs. Pygidial area with fine and dense, long pubescence. Epicnemial areas below with a large round patch of fine, not very dense pubescence. Back of propodeum except narrow upper margin with fine, long pubescence.

Length about 6,5 mm.

Male. — Resembling female, with following exceptions. Third and following segments of antennae reddish-brown below. Apex of gaster and apical spine brown.

Clypeal teeth much shorter than those of female, emargination more rectangular-triangular. Interantennal carina about one and a half times as broad as ocelli or, at most, as broad as first antennal segment, in the female this carina about one and a half times as broad as first antennal segment. Upper part of frons and vertex with oblique striation. Antennal segments 3—11 at least one and a half times as long as broad at apex, 13th segment about twice as long as broad at base, segments 3—8 with linear, brown and shining tyloidea, on ninth segment reduced to a point. Posterior surface of propodeum with coarse carination, but almost smooth behind enclosed area of propodeum. Second recurrent vein of fore wings ending more close to base of third submarginal cell.

Length about 6 mm.

W Pakistan: 2 ♀, holotype and paratype, Quetta, Aug., 1903, 1 ♂, allotype, Aug., 1903, 2 ♂, paratypes, June and Aug., 1903, coll. Col. C. G. Nurse (BM, 1920—72).

P. bisicatus is closely related to *P. atratus* (Fabr.), from which it differs by the broader interantennal carina and the smooth posterior surface of the propodeum. It is easily distinguished from *P. meridionalis* de Beaumont, which also has a broad interantennal carina, by the larger extent of the smooth part of the propodeum, the shining and very finely punctate vertex, and the finely punctate scutum, and from *P. pan* de Beaumont, described from Turkey, by the longer antennal segments of the male and the longer clypeal teeth of the female. It differs from *P. laevis* Gussakovskij, which according to the description also has a sparsely punctate mesonotum, by the long clypeal teeth and by the colour of the legs.

Group of *Psenulus suifuensis*

Psenulus suifuensis spec. nov.

Female. — Black; underside of last four antennal segments very dark brown; tegulae, fore and mid tarsi and apices of hind tarsi dark brown. Veins of wings black.

Clypeal margin protruding medianly, distinctly bidentate (Fig. 3), disk densely punctate. Face above clypeus also densely punctate, medianly longitudinally striato-punctate. Frontal carina raised and ovally broadened between antennae (Fig. 5), deeply excavate. No transverse carina below antennae. Frons densely punctate. Vertex behind ocelli transversely striate. Sloping posterior surface of vertex laterally almost impunctate and shining, tempora very finely obliquely striate, occipital carina not ending in hypostomal carina (Fig. 4). Third antennal segment about two and a half times as long as broad at apex, fourth and fifth segments about one and a half, following segments about one and a third times as long as broad at apex, last segment about one and three quarters times as long as broad at base. Mandibles rather broad.

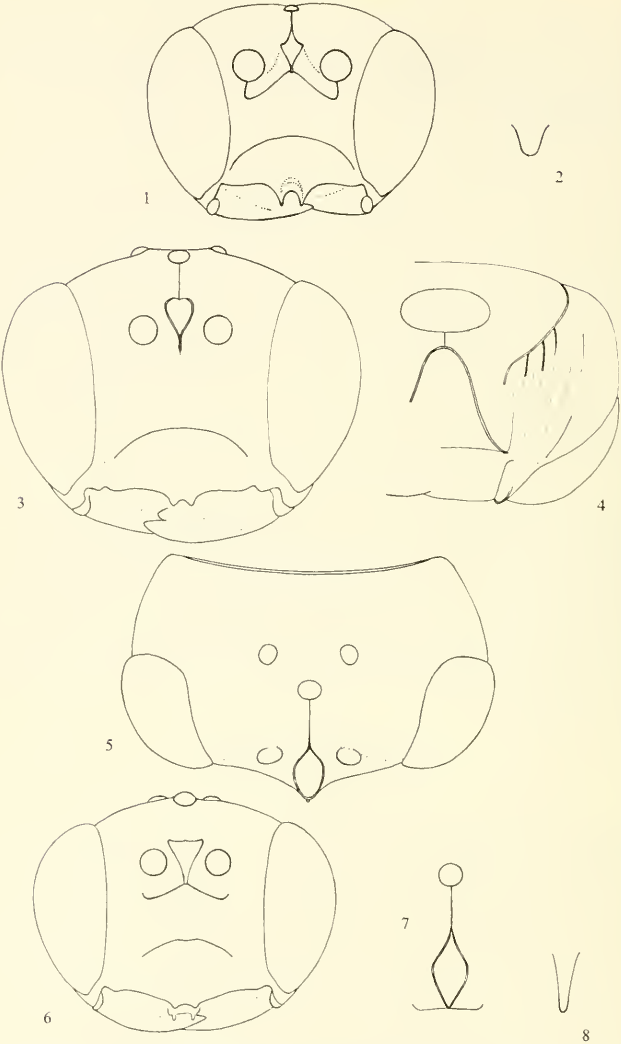


Fig. 1—8. Species of South Asiatic *Psenulus*. 1—2, head and pygidial area of female of *P. bisicatus* sp. nov.; 3—5, head in frontal, ventral and dorsal view of female of *P. suifuensis* sp. nov.; 6—8, head, interantennal carina in dorsal view, pygidial area of female of *P. bicinctus* Turner

Scutum irregularly punctate, median part with large impunctate shining areas. Posterior margin of scutum striato-punctate. Prescutal sutures about as long as anterior third of scutum. Scutellum with elongate punctures. Metanotum indistinctly punctate. Enclosed area of propodeum with oblique longitudinal carinae, area between median two carinae irregularly carinate. Posterior surface of propodeum shining, with a few fine, hair-bearing, punctures. Sides of propodeum with indistinct sculpture. Mesopleura and mesosternum with fine punctures. Legs normal, outer side of hind tibiae with one small thorn, at a distance of about one-fourth of total length from apex. First recurrent vein of fore wings ending in second submarginal cell, which is pentagonal; second recurrent vein ending in third submarginal cell.

Apex of petiole reaching about as far as apex of femora. Underside of petiole raised into an indistinct keel. Sides with shallow groove and fine, irregular, punctures. Base of petiole dorsally with V-shaped carina, reaching beyond middle, apical part with shallow, broad, groove. Gaster with fine punctures, hind margins of tergites almost impunctate, pygidial area very weakly indicated. Second gastral sternite with ill-defined, almost impunctate, semi-elliptic depression, rest of gastral sternites finely punctate.

Face with appressed silvery pubescence and long, erect, whitish hairs. Ventral side of thorax with dense, whitish, short pubescence and also with long hairs. Epicnemial areas below with circular patch of yellowish-grey pubescence. Fourth and fifth gastral sternites with dense fringe of short, whitish, hairs. Sixth sternite densely whitish-pubescent. Rest of body greyish-pubescent.

Length about 9 mm.

Male unknown.

China: 1 ♀ (holotype), Suifu, Szechuen, April-May, 1928, coll. D.C. Graham (USNM).

This is one of the few species of *Psenulus* in which the occipital carina does not end in the hypostomal carina, while the transverse carina below the antennae is lacking.

Group of *Psenulus rufobalteatus*

Psenulus rufobalteatus Cameron

1904, Cameron, Ann. Mag. Nat. Hist. (7) 13: 219, ♀ (*Psen rufo-balteata*; Assam).
1962, Van Lith, Zool. Verh. Leiden 52: 111.
1965, Van Lith, Zool. Verh. Leiden 73: 59.

Original description: "Black; the apex of the second abdominal segment and the whole of the third rufous; the fifth and following joints of the antennae testaceous beneath. Legs thickly covered with white hair; the spurs pale rufous. Wings clear hyaline; the first cubital cellule in front is half the length of the second, the first recurrent nervure is received very near the first transverse cubital, the second at twice the distance from the second transverse cubital. ♀.

Length 5 mm.

Hab. Khasia Hills. Coll. Rothney.

Antennae stout, thickened towards the apex; the scape beneath sparsely covered with long black hair. Face and clypeus thickly covered with silvery pubescence; the front and vertex almost bare, sparsely punctured; the eyes almost parellel; the ocelli in pits; the front with a shallow central furrow; antennal tubercle large, the apex triangular, its sides distinctly margined, the middle depressed; below this is a larger one, roundly incised at the apex, the sides rounded. Pro- and mesothorax shining, sparsely covered with white hair; the mesonotum distinctly but not closely punctured; the scutellums with a few fine punctures. Area on the base of metanotum narrow, elongate, and marked with stout striae; the central furrow is wide and deep, becoming slightly wider towards the apex, and marked with a few stout striae; on either side of it at the apex is a large leaf-like expansion, its apex transverse, on the outer side covered with long hair; at its base is a small rounded projection. Pro- and mesopleurae finely and sparsely punctured; below the mesopleural tubercles is a wide, deep, slightly oblique furrow, marked with some transverse keels; there is a smooth furrow near the base of the metapleurae; the apex of the latter is rugose and is marked with some transverse keels.

Comes near to *P. rufiventris*, but is quite distinct therefrom."

The holotype, which is in the type-collection of the Oxford University Museum, is badly damaged. The gaster is partly missing, the left antenna is broken off after the third segment and there is a hole in the sixth segment of the right antenna. A redescription based on this specimen is given below. No further material has been collected.

Female. — Head black, palpi testaceous, middle part of mandibles dark reddish, underside of fourth and fifth antennal segments brown, remainder of underside light brown. Upper side of antennae somewhat darker. Thorax completely black, tegulae and legs dark brown. Tibial apical spurs yellowish-white. Veins of wings very dark brown. Petiole black, first gastral tergite dark brown with somewhat transparent margin, second tergite and sternite pale red, base of third tergite and, according to the original description, also the rest of the gaster black.

Median part of anterior margin of clypeus with two triangular teeth, margin much depressed. Anterior margin of labrum laterally with a long tooth. Frontal carina fine but distinct, raised interantennal part much broadened, lozenge-shaped, below the antennae this carina ends in a transverse carina, which, in frontal view, has the shape of a broad inverted V. Between this transverse carina and the clypeus, a large, distinct, circular depression. Face below transverse carina densely punctate. Frons and vertex shining, below ocelli finely but distinctly punctate, vertex sparsely punctate, with very slight tendency to oblique striation. Antennae rather short, clavate, 10th and 11th segment almost as long as broad at apex, last segment nearly twice as long as broad at base.

Scutum shining, finely but distinctly punctate, interspaces generally twice or four times as large as punctures. Prescutal sutures and parapsidal sutures normal, distinct. Scutellum and metanotum sparsely punctate. Enclosed area of propodeum depressed, longitudinal carinae sharp, median pentagonal area with irregular median longitudinal carina. Posterior surface of propodeum shining, smooth behind enclosed area, lower part finely punctate. Sides of propodeum dorso-laterally with coarse carination, forming a row of large, almost square, depressions. First recurrent vein of fore wings ending in second submarginal cell, second recurrent vein ending well in third submarginal cell.

Petiole rounded below, dorsally with shallow longitudinal groove, laterally with low longitudinal ridge, above this, on basal half, a much sharper carina.

Pubescence long and whitish, dense on thorax. Epicnemial areas below with large and round patch of silvery pubescence.

North India: 1 ♀, Assam, Khasia (OUM). This specimen was labelled "type" by Cameron.

P. rufobalteatus is closely related to *P. bicinctus* Turner, from Shillong (Assam). In the latter species also the last gastral segments are red. The circular depression below the transverse carina of the face is less deep — in the Palaearctic *P. concolor* (Dahlbom) this character is not constant! — the antennae are dark brown below instead of light brown.

The following error in my 1965 paper should be corrected: in the description of *Psen rufoannulatus*, the 18th sentence on page 59 should read: "a. I could not find any other specimen of *P. rufoannulatus*" etc. (instead of "*P. rufobalteatus*").

Psenulus bicinctus Turner

1912, Turner. Ann. Mag. Nat. Hist. 8 (10): 363-364, ♀ (Assam).

Redescription of female. — Head and thorax black; apex of mandibles dark reddish, underside of antennae brownish, palpi and tegulae dark brown. Legs dark brown. Veins of wings black, stigma brown. Petiole including ventral plate, first, third, and fourth tergites, except hind and lateral margins, black. Rest of gaster, including second, fifth and sixth sternites red.

Disk of clypeus slightly convex, depressed anterior margin bidentate. Clypeus and face coriaceus. Interantennal carina raised, broadened and excavate between antennae (Fig. 7), narrowing into transverse carina below antennae (Fig. 6). Frons densely and finely punctate, vertex more widely punctate. Interocellar area very weakly rugose. Antennae somewhat clavate, third segment nearly two and a half times as long as broad at apex, segments 9—11 slightly longer than broad at apex and last segment about one and three quarters times as long as broad at base.

Scutum distinctly punctate, interspaces on disk generally a few times as large as diameter of punctures, denser near prescutal sutures, which are distinct only on anterior half of scutum. Parapsidal sutures fine, connected with hind margin of scutum by a deeper groove. Scutellum and metanotum finely punctate. Enclosed area of propodeum narrow, strongly foveolate and sometimes separated from metanotum by a triangular rugose area. Longitudinal sulcus on back of propodeum broad, central part deepest, above and below this deeper part a few transverse carinae. Propodeum on dorsal part shining, posterior surface with fine punctures, separated from the sides, which have a reticulate carination, by a foveolate groove. Mesopleura and ventral side of thorax finely punctate. Anterior plate of mesepisternum finely punctate. Anterior oblique suture coarsely foveolate, widened upper part with a few transverse carinae. Legs normal. First recurrent vein of fore wings ending in first, second recurrent vein in third submarginal cell. Only apical third of petiole above weakly sulcate, sides somewhat keeled, ventral side rounded. Gaster finely and widely punctate. Pygidial area (Fig. 8) elongate-triangular, slightly narrowed towards apex, finely punctate. Base of second gastral sternite with indistinct, semi-elliptic depression, not well-defined.

Face with silvery appressed pubescence, also with long erect greyish hairs. Vertex and thorax with long greyish hairs. Underside of thorax densely whitish-pubescent. Epicnemial areas below with a patch of dense pale pubescence. Gaster with short yellowish pubescence, longer and denser at apex, hind margin of fourth and fifth gastral sternites with short and dense pale pubescence, sixth sternite with a large patch of dense golden-brown pubescence.

Length about 8 mm.

First description of male: Pronotal tubercles slightly paler, dark brown. Veins of wings brown. First tergite only on basal half black and of third tergite only posterior part black. Apical spine dark brown.

Clypeal disk more strongly convex. Interantennal carina broadened and excavate, as in female and ending below in a transverse carina. Frons densely but finely punctate, vertex shining, with a few small and some larger punctures, less densely punctate than in female. Antennae slender, third segment slightly longer than twice, following segments about twice as long as broad at apex, last segment nearly two and a half times as long as broad at base. Antennal segments 3—11 with long, somewhat oblique tyloidea, on last segments gradually diminishing, on 12th segment indistinct.

Prescutal sutures not distinct. Propodeum as in female, but apical third of back of propodeum with coarse reticulate carination. First recurrent vein of fore wings interstitial.

Petiole dorsally with distinct longitudinal groove, edged laterally, sides with narrow groove, ventral side of petiole rounded. Second gastral sternite without semi-elliptic depression.

Face with dense and appressed, silvery pubescence and also with long, erect, greyish hairs.

Length about 6,5 mm.

Assam: Turner recorded four females of which I have seen two specimens: Shillong, July, 1903, coll. R. Turner 1905—125 (BM).

New record from Assam: 1 ♀, Upper Shillong, 5000 ft, 2 May, 1962, coll. V. Gupta (UDE).

Sikkim: 1 ♂ (allotype), Tsuntang, 6000 ft, 24 April, 1924, coll. Major W. G. Hingston, Everest Exp. Brit. Mus. 1924—386 (BM).

Nepal: 1 ♀, Dunche, 28 km N of Trisuli (Nawakot), 1950 m, 7—12 Nov., 1965, coll. L. W. Quate (BISH). This female is darker than those from Assam. Mandibles and antennae almost completely black; femora and tibiae black, instead of brown; fourth tergite completely and basal half of fifth gastral tergite, black. Narrow hind margin of third, fourth and fifth sternites reddish. Interocellar area distinctly punctate. Below transverse carina a circular depression, more distinct than in the females from Assam. Parapsidal sutures not connected with posterior groove of scutum. Groove on posterior dorsal side of petiole about half as long as length of petiole. First recurrent vein of fore wings ending in second submarginal cell.

I am inclined to consider *P. bicinctus* as a subspecies of *P. rufobalteatus*, if not as identical, but in the original description Cameron stated that the gaster of the latter form is black and only the apex of the second abdominal segment and the whole of the third are rufous. Unfortunately the greater part of the third and following segments of the type of *P. rufobalteatus* are missing. Cameron did not mention the abdomen being damaged.

Group of *Psenulus scutatus*

Psenulus scutatus scutatus (Rohwer)

1921, Rohwer, Phil. Jl. Sc. 18 (3): 310-312, ♀ and ♂ (*Diodontus scutatus*; Luzon).
1923, Rohwer, Phil. Jl. Sc. 22 (6): 596.
1962, Van Lith, Zool. Verh. Leiden 52: 23-27 (*Psenulus scutatus scutatus*; Luzon, Samar, Negros).

New records from Luzon: 1 ♀ and 2 ♂, Atimonan, prov. Quezon, 1—8 July, 1908, coll. Micholitz (ZMB); 1 ♀, Montalban, prov. Rizal, 25 March, 1954, coll. P. Feliciono (BPIM); 1 ♀, 25 March, 1965 and 1 ♂, 3 March, 1965, Mt. Montalban, prov. Rizal, Wa-wa Dam, 150—200 m, coll. L. M. Torrevillas (BISH).

Complementary descriptions are given here. Female. — Third antennal segment about two and a half times as long as broad at apex, segments 9—11 shorter than broad at apex, last segment nearly one and a half times as long as broad at base. Longitudinal sulcus on posterior side of propodeum narrow, near apex ending in a short transverse carina. Anterior oblique suture almost linear, widened upper part smooth. Second gastral sternite with usual basal depression, no well-defined semi-elliptic depression.

Male. — In the male from Mt. Montalban the whole narrow area of the scutum between the median scutal lines is also black. The subalar area of the fore wings has a yellow spot. All coxae yellow. Antennae moniliform, dorsal part black, underside yellow, third segment about twice as long as broad at apex, segments 4—8 about one and a half times as long as broadest part, segments 9—11 gradually shorter, 12th segment about as long as broad and 13th segment about twice as long as broadest part. Third segment somewhat flattened, segments 4-12 strongly convex on ventral side. Anterior oblique suture very strongly foveolate, foveoles open to the rear, widened upper area with one transverse carina. Mesosternum with short transverse carinae on either side of median carina. Face with silvery appressed pubescence and also with long erect hairs; mesosternum not densely pubescent.

The extent of the black marking of the thorax, especially of the scutum, is considerably larger in the male than in the female. This great colour dimorphism is unusual in the genus *Psenulus*. The marking of the scutum is variable in the females and it may be reduced from a large median spot on the scutum, extending outwards over the prescutal sutures, to two separated, small and square, black spots between the prescutal sutures, as in the first mentioned female from Montalban, or even the scutum may be completely yellow, as in the female from Mt. Montalban, Wa-wa Dam. At first glance this latter specimen might be confused with *P. baltazarae luteus* (Van Lith, 1962) but the clypeal margins are different.

Psenulus baltazarae baltazarae Van Lith

1962, Van Lith, Zool. Verh. Leiden 52: 31-32, ♀ (Luzon).

New record: 1 ♀, Luzon, Mt. Montalban, Rizal, Wa-wa Dam, 150—200 m, 10 March, 1965, coll. H. M. Torrevillas (BISH).

In this female the marks on the outer side of the prescutal sutures are reduced to an irregular, vague, pale brown spot over the parapsidal sutures, slightly longer than one-fourth of the length of the scutum.

Group of *Psenulus quadridentatus*

Psenulus quadridentatus Van Lith

1962, Van Lith, Zool. Verh. Leiden 52: 37-38, ♀ and ♂ (Malaya).

New record: 1 ♀, Vietnam, Fyan, 1200 m, 11 July—9 Aug., 1961, coll. N. R. Spencer (BISH).

This specimen agrees fully with the description of the Malayan specimens. The semi-elliptic depression of the second gastral sternite is not well-defined. The hind margins of the fourth and fifth gastral sternites are covered with dense and short pale pubescence. Sixth gastral sternite with longer, backward-directed, golden-brown pubescence.

Psenulus separatus Van Lith

1962, Van Lith, Zool. Verh. Leiden 52: 38, ♀ (Java).
1967, Van Lith, Ent. Ber. 27: 19-20, ♀ (Borneo).

New records: Borneo, 1 ♀, Sarawak, Mt Dulit, 4000 ft, Moss forest, undergrowth, 15 Oct., 1932, Oxford Univ. Exp., coll. B. M. Hobby and A. W. Moore (BM 1933—254).

I have compared this female with the holotype. Mandibles, pronotal tubercles, tegulae and legs are somewhat more reddish yellow. Fore coxae completely brown (partly yellowish-white in the female from Java), mid and hind coxae reddish with brown base (in the holotype hind coxae completely yellowish-white). The scutellar suture shows only one median, indistinct, short longitudinal carina; in the holotype there are also a few indistinct lateral carinae. Pygidial area as in the female earlier recorded from Borneo, i.e. slightly broader than in the female from Java.

Length nearly 9 mm.

The original description should be supplemented as follows: axillae rather flat and appearing almost rectangular, lateral parts of scutellum little depressed. Hind margin of scutellum laterally with rectangular, densely punctate patch, covered with dense yellowish-grey pubescence. Apex of mid tibiae with a number of strong thorns.

Psenulus parvidentatus spec. nov.

Female. — Head and thorax black; mandibles largely dark reddish, palpi testaceous, apex of scape and underside of flagellum reddish-brown, pronotal tubercles dark brown, tegulae yellowish-red. Trochanters, apices of femora, fore tibiae, fore side of mid tibiae, base of hind tibiae and fore and mid tarsi yellowish-brown. Veins of wings dark brown. Petiole yellowish, except extreme apex and ventral plate, which are brown. Gaster reddish, first gastral tergite dorsally largely blackish-brown.

Disk of clypeus with fine punctures, apical margin depressed and with two small teeth, distance between these teeth about one-eighth of total distance between the eyes (Fig. 9). Interantennal carina between the eyes raised, much broadened (Fig. 10) and concave; below the antennae the interantennal carina ends in a short, arched, transverse carina (Fig. 9). Frons and vertex smooth and shining, with extremely fine and wide-spread puncturation. Antennae somewhat clavate, third segment nearly two and a half times as long as broad at apex, segments 9—11 broader than long, last segment about one and a half times as long as broad at base. Scutum with fine widespread puncturation and a few larger punctures. Prescutal sutures distinct on anterior two-thirds, vague on posterior third of scutum. Scutellum and metanotum with widespread punctures. Enclosed area of propodeum short, triangular, no median longitudinal carina. Back of propodeum smooth, upper part shining, without hair-bearing punctures. Median longitudinal sulcus narrow. Sides of propodeum almost smooth, edge between back and sides with some irregular carination. Anterior oblique suture coarsely foveolate, widened upper part with some transverse carinae. Hypo-epimeral area distinct. Legs normal, apex of mid tibiae with four red spines. Second submarginal cell of fore wings normal; first recurrent vein ending in first submarginal cell, almost interstitial, second recurrent vein ending in third submarginal cell, distance from second submarginal cell about one-fourth of base of third.

Petiole cylindrical. Pygidial area long and narrow, lateral carinae distinct (Fig. 11). Second gastral sternite with indistinct semi-elliptic depression.

Pubescence of face silvery, leaving sculpture visible, appressed and also with long greyish hairs. Depression of interantennal carina laterally with a row of long hairs. Back of propodeum densely greyish-white pubescent. Rest of body also with greyish-white pubescence, denser on mesosternum. Epicnemia below with a round patch of golden-brown pubescence. Margin of fourth and fifth gastral sternites with dense, short, greyish pubescence.

Length about 7 mm.

Male unknown.

Formosa: 1 ♀ (holotype), Taihorin, April, 1910, coll. H. Sauter (ZMB).

This species seems to be closely related to *P. macrodentatus* (Van Lith, 1962) and therefore, although the enclosed area of the propodeum is not linear, I have placed it in the group of *P. quadridentatus*.

Tsuneki (1966) described two males from Formosa, with somewhat paler legs, but otherwise very similar, as *P. quadridentatus formosanus*. As long as the shape of the clypeal margin of the corresponding Formosan female is unknown there remains some doubt in regard to the systematic status of *formosanus* and also the validity of the name *parvidentatus*.

Group of *Psenulus nasicornis*

Psenulus nasicornis spec. nov.

Female. — Head black; mandibles except black teeth and scape of antennae yellow. Palpi, labrum and flagellum of antennae yellowish-red. Thorax black; dorsal part of pronotum and pronotal tubercles yellow. Scutellum and metanotum, except scutellar anterior groove and the depressed lateral parts, yellow. Axillae black. Fore and mid legs including coxae yellow, tarsi and hind legs completely yellowish-red. Veins of wings yellowish-red, subcosta brown. Gaster including petiole yellowish-red.

Median part of clypeal margin much protruding and with two small teeth, close together (Fig. 12). Lower half of clypeal disk protruding medianly into a distinct tooth (Fig. 15). Puncturation of disk dense but not deep. Interantennal carina raised and much broadened between antennae (Fig. 13), dorsal surface hardly concave, ending

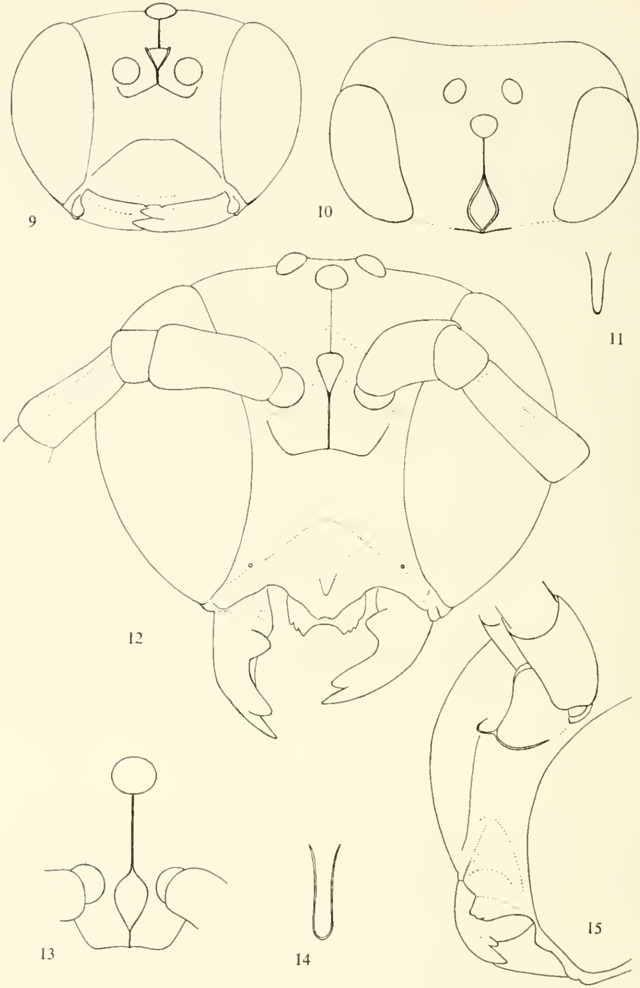


Fig. 9—15. Species of Oriental *Psenulus*. 9—11, head in frontal and dorsal view, pygidial area of female of *P. parvidentatus* sp. nov. (Formosa); 12—15, head, interantennal carina in dorsal view, pygidial area, face in lateral view of female of *P. nasicornis* sp. nov. (Celebes)

below antennae in an arched, distinct, transverse carina. Frons and vertex not distinctly punctate. Labrum with large emargination. Mandibles bidentate at apex and with a strong basal tooth. Scape of antennae concave on inner side, third antennal segment with deep groove on basal two thirds, also fourth segment somewhat depressed; third segment about two and a half times and fourth segment about one and a half times as long as broad at apex, segments 9—11 about as long as they are broad at apex, last segment about one and two-thirds times as long as broad at base.

Anterior lateral corners of pronotum pointed. Scutum with very fine piliferous punctures and with many large but shallow punctures (interspaces between the latter once or twice diameter of punctures). Length of prescutal sutures just over one third of scutum. Scutellum and metanotum finely punctate. Enclosed area of propodeum depressed, posteriorly not sharply defined; also oblique longitudinal carinae unsharp. Enclosed area and longitudinal groove separated by a semicircular strong carina. Groove except widened upper part narrow, ending before apex in a few strong transverse carinae. Back of propodeum with wide-spread puncturation, lower half and sides of propodeum with transverse carinae, carination on the sides more irregular. Anterior part of sides of propodeum smooth. Mesopleura and metapleura almost smooth. Anterior oblique suture weakly foveolate, widened upper part with a few very weak transverse carinae. Apex of mid tibiae with a longitudinal row of four, sometimes five, reddish thorns and another single tooth at the apical margin. Base of hind tibiae on outer side with cluster of small red teeth, halfway tibiae one much stronger thorn, sometimes two thorns, and also apex with a few reddish thorns. Tibiae bare between the small basal teeth and the thorn halfway. First recurrent vein of fore wings about interstitial. Petiole cylindrical. Second gastral sternite without distinct semi-elliptic depression. Gaster with very fine piliferous punctures. Pygidial area narrow, lateral carinae almost parallel, only at base somewhat diverging (Fig. 14).

Pubescence of face silvery and appressed, with a few long erect hairs. Hairs on rest of body yellowish. Back of propodeum fully pubescent, enclosed area bare. On lower part of epicnemial areas a large patch of yellowish appressed pubescence. Mesosternum with short dense pubescence and a number of long and erect hairs. Margin of fourth and fifth sternites with dense, short, white pubescence; disk of sixth sternite with dense, short, yellowish pubescence. Wings densely yellowish-pubescent.

Length about 11,5 mm.

Male unknown.

SE Celebes: 3 ♀ (holotype and paratypes), Tangke Salokko Mountain, 1500 m, 1—15 Jan., 1932, coll. G. Heinrich (ZMB, one paratype in the author's collection).

This large wasp shows affinities with the group of *P. quadridentatus*, in some respects also with the group of *P. pulcherrimus*, but the combination of its characters does not allow its placing in any of these groups. The species is easily distinguished by the broad interantennal carina, which is not distinctly concave dorsally, and by the tooth on the clypeal disk.

Group of *Psenulus antennatus*

Psenulus bengalensis spec. nov.

Male. — Head and thorax black, mandibles also dark, underside of first two segments of antennae brown, basal half of underside of segments 3—6 brown, palpi testaceous, labrum dark brown, pronotal tubercles dark brown, tegulae reddish-brown. Legs pale red, trochanters and underside of fore and mid femora brown. Gaster including petiole pale red. Veins of wings brown.

Clypeal disk convex, more than in *P. antennatus* (Rohwer), anterior margin of clypeus with two short teeth (Fig. 16). Clypeus and face not distinctly punctate. Interantennal carina raised, broadened and concave between antennae (Fig. 17), ending below antennae in a transverse carina. Frons and vertex with minute punctures. Antennae moniliform, first segments of flagellum somewhat depressed. Antennal segments 3—12 about twice as long as broad at apex, segments 4—12 with distinct, narrow, oblique tyloidea, on fourth segment length of tyloidea about one-third of length of segment, on segments 5—8 about half that length, on ninth and 10th segment slightly shorter and on 12th segment very small, last segment narrower, more than twice as long as broad at base.

Scutum with fine punctures, intermixed with a few large punctures, which are most distinct along the prescutal sutures. The latter sutures only distinct on anterior half, on posterior part replaced by an irregular row of large punctures. Anterior oblique suture coarsely foveolate, widened upper part with transverse carinae. Mesopleura with fine punctures. Hypo-epimeral area distinct. The scutellar suture is deformed in the holotype. Enclosed area of propodeum longer than in *P. antennatus* ♂, with a distinct, slightly irregular median longitudinal carina. Upper two-thirds of back of propodeum (Fig. 18)

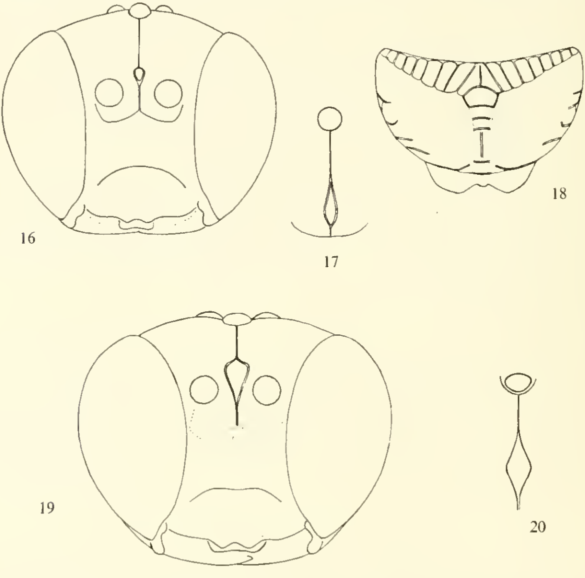


Fig. 16—20. Species of South-Asiatic *Psenulus*. 16—18, head, interantennal carina in dorsal view, propodeum of male of *P. bengalensis* sp. nov.; 19—20, head, interantennal carina in dorsal view of female of *P. nietneri* sp. nov.

smooth, longitudinal sulcus broad and deep, especially in the middle part of the propodeum, above and below this deeper part a few transverse carinae. Between hind surface and sides of propodeum an edge of coarse, irregular carination, lower third of hind surface of propodeum also with coarse, irregular carination. Greater part of sides of propodeum smooth.

Legs slender. Second submarginal cell normal. First recurrent vein of fore wings ending in second submarginal cell, second recurrent vein ending well in third submarginal cell. Petiole reaching about as far as hind femora. Anterior half of petiole almost quadrate, rest of petiole nearly cylindrical.

Face with silvery pubescence, mostly appressed, rest of body with somewhat yellowish pubescence.

Length about 7 mm.

Female unknown.

India: 1 ♂ (holotype), Bengal, Senchal Range, Darjeeling, 27 July, 1923, coll. J. C. M. Gardner, No. 63 and No. 320 (USNM).

P. bengalensis differs from *P. penangensis* (Rohwer) — judging from the original description of the female holotype — in having a smooth propodeum and a longer enclosed area of the propodeum.

It is closely related to *P. antennatus*, but differing in the colour of the petiole, as well as in the hind surface of the propodeum being almost completely smooth. *P. antennatus* too has tyloidea on antennal segments 3—11, but these are indistinct.

There are also close relationships with the group of *P. quadridentatus*, in which the petiole sometimes is red and the hind surface of the propodeum is smooth. However, in this group the enclosed area of the propodeum is much reduced and in the male of *P. quadridentatus* (Van Lith, 1962) only indistinct tyloidea can be found on segments 4—6.

The pin also bears the labels "parasitic on" (printed) and "not yet id[enti]f[ie]d Hepialidae" (handwritten). Probably a hepialid caterpillar and the wasp were found together in a stem or twig, which is the usual nesting place of *Psenulus*. The prey of this species will undoubtedly prove to be a homopteron.

Psenulus nietneri spec. nov.

Female. — Head and thorax black; mandibles and labrum yellowish-brown; scape of antennae yellowish-red, upper side of flagellum dark brown, underside of flagellum reddish-brown. Pronotal tubercles, tegulae, legs including trochanters, and gaster including petiole yellowish-red. Coxae brownish. Veins of wings dark brown.

Frontal carina between antennae raised, broadened and concave (Fig. 20), narrowed below antennae and ending in an arched tubercle which is not sharpened into a transverse carina. Anterior margin of clypeus with two distinct triangular teeth (Fig. 19). Frons densely and distinctly punctate, with fine oblique striation between anterior ocellus and oculi. Puncturation of vertex more wide-spread. Antennae somewhat clavate; third segment about twice as long and segments 9—11 about as long as broad at apex; last segment slightly more than one and a half times as long as broad at base. Prescutal sutures distinct on anterior two-thirds of scutum, vague on posterior part. Anterior third of scutum with fine transverse striation, in front of scutellum some irregular longitudinal striation. Scutellum and metanotum with fine and widespread puncturation. Enclosed area of propodeum normal, behind this a smooth and shining area; back of propodeum with fine sculpture and punctures. Median sulcus broad and deep on upper half, lower half narrower, almost reaching apex. Sides of propodeum smooth, between back and sides an irregularly carinate edge. Mesopleura densely but not deeply punctate. Anterior oblique suture coarsely foveolate, widened upper part with some transverse carinae. Second submarginal cell normal. First recurrent vein of fore wings interstitial, second recurrent vein ending well in third submarginal cell.

Petiole cylindrical, reaching about as far as apex of hind femora. Second gastral sternite without distinct semi-elliptic depression. Pygidial area only indicated by a slight, narrow, longitudinal depression, no lateral carinae.

Face with appressed silvery pubescence and also with long, erect, whitish hairs. Concave broadened part of interantennal carina laterally with a row of whitish hairs. Thorax with whitish pubescence, which is denser on mesosternum; epicnemial areas below with a round patch of yellowish pubescence. Gaster with yellowish-grey pubescence. Margin of fourth and fifth gastral sternites with dense and short white pubescence.

Length about 7 mm.

Male unknown.

Ceylon: 1 ♀ (holotype), coll. Nietner (ZMB).

This species is easily distinguished from *P. antennatus* by the red legs and petiole.

Group of *Psenulus erraticus*

Psenulus erraticus Smith

1861, Smith, Jl. Proc. Linn. Soc. Zool. 5: 85, ♀ (*Psen erraticus*; Celebes).
1962, Van Lith, Zool. Verh. Leiden 52: 48-49.
1970, Van Lith, Steenstrupia 1 (10): 95-96.

New records: Vietnam: 2 ♀, Dai Lanh, N of Nha Trang, 30 Nov.—5 Dec., 1960, coll. C. M. Yoshimoto (BISH).

These females have been compared with a female collected in the Philippine island Tawi Tawi and which probably belongs to the subspecies *basilanensis* (Rohwer). They are all very similar.

However, the back of the propodeum medianly, just behind the enclosed area, is not densely pubescent as in the Philippine specimen, but almost bare, leaving the coarse reticulate carination distinctly visible. The petiole is less heavy. They may belong to a new subspecies.

Thus far I have seen females from Vietnam, Borneo, Celebes, Tawi Tawi and Basilan and males from Singapore and Mindanao. A comparative study, based on more extensive material, is needed. The characters used for distinguishing the subspecies are only slight and their constancy should be confirmed.

Group of *Psenulus crabroniformis*

Psenulus crabroniformis (Smith)

1858, Smith, Proc. Linn. Soc. Zool. 2: 107, "♀" (♂!) (*Mellinus crabroniformis*; Borneo).
1887, Handlirsch, Sitzb. kais. Akad. Wissensch. 96: 294.
1907, Cameron, Jl. Straits Br. R. As. Soc. 48: 23-25.
1962, Van Lith, Zool. Verh. Leiden 52: 51-53 (*Psenulus crabroniformis*).

Two females from Thailand differ so little from the holotype (♂), from Borneo, that I am not able to distinguish these females as a new subspecies. The Thailand specimens have darker femora, the greater part being dark brown instead of pale red, as in the male from Borneo, and the hind femora have small black streaks which are lacking in this male. The veins of the wings are dark brown; these are much paler in the holotype but they may have faded in this old specimen.

Description. Female. — Head black with following exceptions: mandibles yellow with dark red tips, palpi light brown, labrum reddish, scape of antennae yellow, underside of flagellum reddish-brown. Thorax black, but pronotal tubercles yellow, tegulae pale red. Fore and mid legs yellow, including tips of coxae, but greater part of femora dark brown. Hind legs: tips of coxae reddish, trochanters yellow, rest of legs red except a small black stripe on fore side and back of femora. Gaster, including petiole, red, base of petiole paler. Veins of wings brown.

Clypeus as in the female of *P. crabroniformis sumatranus* (Ritsema). Depressed margin with broad triangular emargination. Lower part of clypeal disk triangularly raised, indistinctly but densely punctate, upper third almost impunctate. Frontal carina prominent between antennae, dorsally slightly broadened, but not excavate. It ends in a transverse carina below antennae which is not much protruding and which does not reach the sides; laterally it is bent upwards to the antennal sclerites. Frons and vertex smooth and shining, punctures minute, a small depression on outer side of lateral ocelli. No tubercles on frons. Antennae rather slender, slightly clavate, segments 9—11 about as long as they are broad.

Pronotum dorsally with sharp anterior carina, declining foreside of pronotum transversely striate. Scutum shining, with few punctures, prescutal sutures indistinct. Scutellum long and flat, scarcely punctate, with broad and foveolate scutellar suture. Metanotum posteriorly with very fine punctures. Enclosed area of propodeum triangular, depressed, with sharp, oblique, longitudinal carinae. Horizontal part of propodeum behind enclosed area smooth and shining. Posterior surface, except a very small area on both sides of median sulcus, and sides of propodeum coarsely reticulate, median upper part of propodeal declivity depressed. Upper half of median sulcus of propodeum normal, as broad as in *P. crabroniformis sumatranus*; lower half of sulcus widened towards apex, shining. Mesopleura and mesosternum sparsely and finely punctate, hypo-epimeral area convex, sparsely punctate. Tarsi of hind legs long, inner spur of hind tibiae about two-thirds of length of basitarsus. First recurrent vein of fore wings received by first, second recurrent vein by third, submarginal cell. Petiole long and slender, cylindrical, reaching beyond apex of hind femora. Gaster with minute punctures, shining, last two tergites very finely coriaceous. No distinct pygidial area.

Appressed pubescence of face silvery. Pubescence of head, thorax and gaster yellowish-grey. Hind femora below with long hairs, upper half of back of femora bare. Lower part of epicnemial areas with round patch of dense pale pubescence. Pubescence of mesosternum long, densest along posterior part of median line.

Length about 10 mm.

Thailand: 2 ♀ (one allotype), Fang, 29 Nov., 1962, coll. A. Nagatomi (HUA).

A female from the Philippine Is. is also very similar to specimens of the nominate form from Borneo. As in the Thailand females the wing-veins are dark brown. The female differs further from the Bornean male in the whitish pubescence of head and thorax. The gaster is lacking.

Fore and mid femora light brown, also tips of coxae. Hind legs reddish, including tips of coxae, apex of hind tibiae brownish. Frons without distinct punctures. Antennal segments 9-11 slightly longer than they are broad.

A study of the indices of the posterior interocellar distance and the ocellar-ocular distance in the various forms of *P. crabroniformis* might be interesting. In one of the Javanese females of *P. crabroniformis sumatranus* the index is 1: 1¾, in the female from Busuanga 1: 1¼.

Philippine Is.: 1 ♀, Busuanga I., 4 km N of San Nicolas, 31 May, 1962, coll. H. Holtmann, Malaise trap (BISH).

Group of *Psenulus tuberculifrons*

Psenulus tuberculifrons tuberculifrons (Rohwer)

1921, Rohwer, Phil. Jl. Sc. 18 (3): 315-316, ♀ (*Diodontus tuberculifrons*; Luzon).
1962, Van Lith, Zool. Verh. Leiden 52: 57-59 (*Psenulus tuberculifrons tuberculifrons*).

New record: 1 ♀, Luzon, Los Baños, 1917, coll. F. X. Williams (BISH).

Psenulus cavifrons Van Lith

1962, Van Lith, Zool. Verh. Leiden 52: 60, ♀ (Samar).

New record: 1 ♀, Mindanao, Zamboanga del Norte, 9,6 km E of Sindangan, 20 July, 1958, coll. H. E. Milliron (BISH).

Scutum with small yellow mark along tegulae (Fig. 21). A small yellow spot on anterior margin of scutellum. Anterior oblique suture narrow but foveolate, upper part widened and with indistinct transverse carinae. Second gastral sternite with long semi-elliptic depression, which is not distinctly defined. Pygidial area: Fig. 22.

Mesosternum with long, backwards-directed, whitish hairs, brown medianly. Epicnemial areas below with round patch of dense pubescence. Margin of fourth and fifth gastral sternites with dense and short, whitish pubescence.

Shields on outer side of lateral depressions of metanotum with a short black tooth, directed obliquely inwards (Fig. 21), which seems to be transition towards the long projections occurring in the group of *P. nigrolineatus*. I also noticed this structure in *P. suluensis* (Van Lith, 1970). It may be another proof of the close relationships between the group of *P. tuberculifrons* (base of hind tibiae with three long spines and, in the Philippine species, with frontal tubercles) and the group of *P. nigrolineatus* (metanotum with very long, inwards-directed, projections, no frontal tubercles and only *P. diversus* having long tibial spines).

Group of *Psenulus nigrolineatus*

Psenulus diversus Van Lith

1923, Rohwer, Phil. Jl. Sc. 22 (6): 597, ♀ (*Diodontus ajax* partim; Singapore).
1962, Van Lith, Zool. Verh. Leiden 52: 70-71 (*Psenulus diversus*).

A female from Vietnam is somewhat darker than the holotype from Singapore.

Median dark line on scutum broader on anterior two-thirds and connected with posterior margin by a narrow line (Fig. 26). Posterior surface of propodeum yellow, divided into four longitudinal parts by two black lines. Hind margin of scutellum more

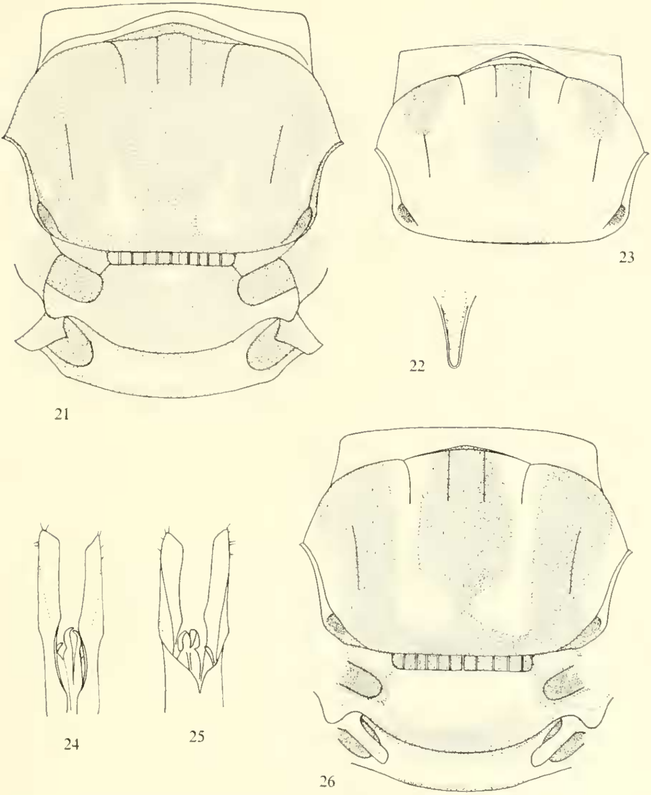


Fig. 21—26. Species of Oriental *Psenulus*. 21—22, thorax and pygidial area of female of *P. cavifrons* Van Lith (Mindanao); 23, scutum of male of *P. luteopictus luteopictus* (Rohwer) (Luzon); 24—25, genitalia in dorsal and ventral view of male of *P. sandakanensis* (Rohwer) (Borneo); 26, thorax of female of *P. diversus* Van Lith (Vietnam)

extensively black. Upper part only of anterior plate of mesepisternum and anterior two-thirds of hypo-epimeral area yellow. Scape of antennae and basal two-thirds of flagellum yellow. Fore femora with a dark brown mark on posterior side, mid femora with yellow foreside and reddish hind surface with yellow knee, hind femora reddish brown, basal half of hind surface yellow. Petiole not darkened at apex, in the holotype the apex is slightly darkened.

Third segment of antennae about three times, fourth and fifth segments slightly more than twice as long as broad at apex, following segments gradually shortening, segments

9—11 about one and a half times as long as broad at apex, last segment nearly twice as long as broad at base.

Anterior oblique suture foveolate, widened upper part smooth. First recurrent vein of fore wings ending in first submarginal cell, second recurrent vein ending in third submarginal cell. Second gastral sternite without distinct semi-elliptic depression. Margin of fourth and fifth sternites with dense, short and pale pubescence.

Vietnam: 1 ♀, Dai Lanh, N of Nha Trang, 30 Nov.—5 Dec., 1960, coll. C. M. Yoshimoto (BISH).

Notwithstanding the long spines at the base of the hind tibiae, which are absent in the other forms of the group of *P. nigrolineatus*, I prefer to maintain *P. diversus* provisionally in this group. The form from Vietnam may belong to a different subspecies.

Group of *Psenulus luteopictus*

Psenulus luteopictus luteopictus (Rohwer)

1921, Rohwer, Phil. Jl. Sc. 18 (3): 319-320, ♀ (*Diodontus luteopictus*; Luzon).
1962, Van Lith, Zool. Verh. Leiden 52: 71-72, ♀ (Luzon, Negros).

Male. — Head black; mandibles yellow except reddish and black tips, palpi yellowish-brown, scape of antennae and first segment yellow, following segments yellow below, dorsally brown.

Ventral and lateral sides of thorax black; yellow are: dorsal side of pronotum, tubercles, scutum except narrow antero-lateral black margin, a large median, oval, black spot, connected with fore margin by a broad line, two triangular black marks on outer sides of prescutal sutures (Fig. 23) and a narrow black hind margin of scutum. Scutellum including axillae and metanotum yellow, depressed lateral parts black. Propodeum yellow; greater part of enclosed area and two adjacent lateral spots, longitudinal stripe over upper half of sulcus on back of propodeum, and apical margin black. Upper two-thirds of anterior plate of mesepisternum, hypo-epimeral area and small adjacent spot below, and upper part of metapleura also yellow. Subalar area of fore wings black. Fore and mid legs including trochanters and lower third of coxae yellow; hind legs brownish but coxae more yellow and fore side of femora darker brown. Veins of wings brown. Gaster including petiole reddish, apical spine reddish with dark tip.

Clypeal margin bidentate, on lower third of clypeus, between the teeth, a semi-elliptic depression. Clypeus and rest of face shining, with fine puncturation. Frontal carina raised into a sharp plate between antennae, not broadened, margin somewhat transparent. Frontal carina ending in a semicircular transverse carina. Frons and vertex shining, with dense piliferous puncturation. Interocellar region raised, bare and shining with only a few irregular punctures, therefore conspicuous as compared with the densely pubescent frons and vertex. Antennae long and slender, slightly clavate, third segment at least three times, fourth segment nearly three times as long as broad at apex, 10th and 11th segments about one and one-third and 12th segment one and a half times as long as broad at apex; last segment about twice as long as broad at base.

Pronotal corners sharp. Scutum with strong puncturation, coarse centrally, interspaces there partly smaller than diameter of punctures. Scutum along basal part of parapsidal sutures somewhat depressed. Length of prescutal sutures about one fourth of scutum.

Enclosed area of propodeum not sharply defined behind, oblique carinae exceeding black part of enclosed area. Back and sides of propodeum with coarse reticulate carination. Median longitudinal sulcus narrow, reaching about halfway back of propodeum.

Anterior oblique suture simple, widened upper part smooth. Mesopleura sparsely punctate. Legs long and slender. First recurrent vein of fore wings ending in first submarginal cell, distance from second submarginal cell about one third of base of second cell; second recurrent vein ending in third submarginal cell, distance from second submarginal cell about one fourth of base of second cell. Gaster slender, petiole long and surpassing end of hind femora, second sternite without semi-elliptic depression. Last tergites somewhat depressed laterally.

Face including frons and also vertex densely pale-golden pubescent, appressed below transverse carina. Tempora with short silvery pubescence and few long hairs. Hairs on back of head, and on thorax, long and yellowish. Pubescence on gaster short, but petiole with a few long lateral hairs.

Length nearly 8 mm.

Philippines: 1 ♂ (allotype), Luzon, Mt. Montalban, Rizal, Wa-wa Dam, 150—200 m, 8 March, 1965, coll. H. M. Torrevillas (BISH).

The male of *P. luteopictus*, now described for the first time, very much resembles the females from Luzon, even in the golden pubescence of the face. The strong puncturation of the scutum seems to be somewhat more dense.

Group of *Psenulus sandakanensis*

Psenulus sandakanensis (Rohwer)

1923, Rohwer, Phil. Jl. Sc. 22 (6): 597-598, ♂ (*Diodontus sandakanensis*).
1962, Van Lith, Zool. Verh. Leiden 52: 73-76, ♂ and ♀ (*Psenulus sandakanensis*).
1967, Van Lith, Ent. Ber. 27: 20, ♂.

New records: N Borneo (SE), Forest Camp, 19 km N of Kalabakan, 60 m, 2 ♀, 17 Oct., 1962, coll. K. J. Kuncheria; 1 ♀ and 1 ♂, 28 Oct., 1962 and 1 ♂, 30 Oct., 1962 (Primary Forest), coll. Y. Hirashima (BISH).

The females have no transverse carina below the antennae. Third antennal segment slightly more than twice, fourth and fifth segments about twice, and sixth and seventh segments about one and a half times as long as broad at apex, segments 8—11 somewhat longer than broad at apex, and last segment about twice as long as broad at base. The anterior plate of the mesepisternum is black. Base of hind tibiae flattened and smooth, upper part of this flattened area margined by a number of tiny thorns. Margin of fourth and fifth gastral sternites with dense and short, whitish pubescence.

In the males antennal segments 3—6 slightly more than twice, and segments 7—12 about twice as long as broad at apex, these latter segments slightly rounded below. Last segment nearly three times as long as broad at base, laterally flattened towards apex. No distinct tyloidea. Genitalia: Fig. 24 and 25. One of the above mentioned males has three black marks on the scutum instead of one and resembles the male from Bettotan (near Sandakan) recorded in 1962. Its mesopleura are partly black along the metapleura. The anterior plate of the mesepisternum is completely dark, while in the males from Sandakan the upper part is yellow. Sometimes the basal half of the first gastral tergite is darkened in the males.

In both sexes the subalar area of the fore wings is much raised, its posterior half is yellow. The anterior oblique suture is narrow, but distinctly foveolate, the widened upper part is smooth. The first recurrent vein of the fore wings ends distinctly in the first submarginal cell, the veins are brown.

Psenulus pagdeni Van Lith

1962, Van Lith, Zool. Verh. Leiden 52: 81-83, ♀ (Malaya).

New records: N Borneo (SE), Forest Camp, 19 km N of Kalabakan, 60 m, 2 ♀, 25 Oct., 1962, coll. K. J. Kuncheria and 1 ♀, 1 Nov., 1962, Malaise trap, coll. Y. Hirashima (BISH).

The apex of the petiole of the Bornean females is darker than in the Malayan specimens, the apical third part of petiole being black-brown, ventrally and dorsally, and also the basal two-thirds of ventral plate. In the holotype only the base of the ventral plate is darkened, in the paratypes the petiole is dorsally slightly or not darkened. The veins of the wings are brown.

The third antennal segment is about two and a half times as long as broad at apex. Segments 9—11 are about as long as broad at apex, the last segment is about one and a half times as long as broad at base.

The longitudinal groove on the back of the propodeum is narrow. The oblique anterior suture of the mesopleura is distinctly foveolate, the widened upper part is smooth.

Group of *Psenulus esuchus*

Psenulus esuchus (Rohwer)

1923, Rohwer, Phil. Jl. Sc. 22 (6): 600-601, ♂ (*Diodontus esuchus*).
1962, Van Lith, Zool. Verh. Leiden 52: 79-80, ♂ (*Psenulus esuchus*).
1967, Van Lith, Ent. Ber. 27: 20, ♂.
1970, Van Lith, Steenstrupia 1: 100, ♂ (Balabac).

Female. — Head black; mandibles yellow with dark tips, palpi yellow, labrum reddish, anterior margin of clypeus somewhat brownish. Scape of antennae yellow, pedicel yellow below, reddish above. Pronotal tubercles yellow. Scutum (Fig. 27) yellow with three broad, black lines; lateral lines not reaching anterior margin of scutum, posteriorly often reaching hind margin; median mark as long as anterior three fourths of scutum, with narrow basal part. Tegulae yellow. Scutellum yellow, rarely with a vague and narrow, longitudinal, brown line. Axillae and metanotum yellow. Base of propodeum with broad black band, median longitudinal groove black, apex of propodeum with two black spots. Epicnemial areas except a yellow margin — in the closely related *corporaali* from Sumatra only the outer keel is yellow — and interepicnemial area black. Anterior plate of mesepisternum yellow, hypo-epimeral area yellow except small, black, posterior tip. Anterior part of mesopleura yellow, connected with lower part of posterior margin by a yellow band. Metapleura black. Mesosternum black, roundly dilated on to lower part of sides of thorax. Fore and mid legs including coxae yellow, tarsi darker. Hind coxae yellow, rest of hind legs yellowish-red but femora dorsally, apical part of tibiae, and tarsi dark brown. Veins of wings brown. Petiole pale yellow, apex laterally dark brown, rest of gaster pale red.

Median part of anterior margin of clypeus straight, with two small teeth, broad depression behind margin, no distinct large punctures. Disk of clypeus strongly convex. Raised part of interantennal carina narrow, ending below antennae in a transverse carina, which is distinct but low. Frons and vertex with fine punctures. Antennae slightly clavate, third segment nearly two and a half times and segments 9—11 nearly one and a half times as long as broad at apex, last segment about twice as long as broad at base.

Pronotum with sharp antero-dorsal carina. Scutum smooth, finely punctate. Prescutal sutures distinct, as long as anterior quarter of scutum. Enclosed area of propodeum triangular, median two carinae diverging; median longitudinal groove on posterior side of propodeum narrow, before apex ending in a transverse carina. Propodeum smooth behind enclosed area and behind metapleura, posterior surface with fine oblique rugae and fine reticulate carination, especially on the sides. Anterior oblique suture indistinctly foveolate, widened upper part smooth. Hypo-epimeral area well-defined. Mid tibiae with low longitudinal depression on apical fifth, defined behind by a row of four small red spines, anteriorly by an oblique raised area and an apical spine. Hind tibiae without distinct depression at base, outer side of base with a number of minute red tubercles. First recurrent vein of fore wings ending in first submarginal cell, rarely interstitial (sometimes in one wing only). Second gastral sternite with indistinct semi-circular depression. Pygidial area narrow, carinae parallel on apical half.

Pubescence of head silvery, appressed on face, whitish on thorax, yellowish on gaster. Hind margin of fourth and fifth gastral sternites with dense and short pale pubescence, also over disk of sixth gastral sternite.

Length 8—8,5 mm.

New records from N Borneo: 12 ♀ and 1 ♂, Forest Camp, 19 km N of Kalabakan, 60 m, 15—30 Oct. and 4—19 Nov., 1962, coll. Y. Hirashima and K. J. Kuncheria (BISH); 1 ♀, Silabukan Forest Reserve, 1 Dec., 1968, coll. C. G. Roche (coll. Roche).

In my opinion *P. esuchus* and *P. corporaali* (Van Lith, 1962) are very closely related, and probably the latter is a subspecies of the former. The main differences — in the females — are that the lateral black lines on the scutum are shorter in *P. esuchus*, but its hind legs and the apical part of the petiole are darker. The male of *P. corporaali* is still unknown.

Because of the fine transverse carina below the antennae I have now placed *P. esuchus*, formerly incorporated in the group of *P. interstitialis*, into a separate group, together with a few closely allied species.

Psenulus corporaali Van Lith

1962, Van Lith, Zool. Verh. Leiden 52: 76-77, ♀ (Sumatra).

Complementary description. Scutum: Fig. 28. Epicnemial areas laterally with narrow yellow margin. Subalar area of fore wings dark brown with small yellow tip. Yellow spot below hind wings. Tibial spines yellowish-brown.

Third and fourth segments of antennae nearly two and a half times as long as broad at apex, following segments gradually shorter, 10th and 11th segments about one and a half times as long as broad at apex, 12th segment almost two and a half times as long as broad at base. Widened upper part of anterior oblique suture with indistinct transverse carinae.

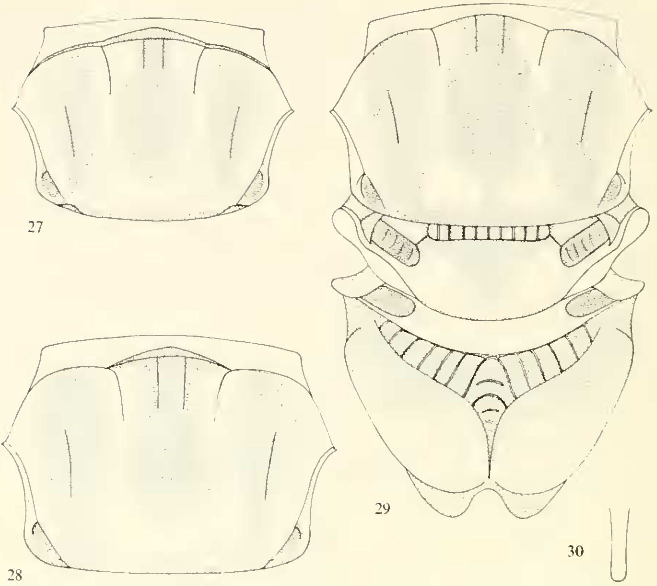


Fig. 27—30. Species of Oriental *Psenulus*. 27, scutum of female of *P. esuchus* (Rohwer) (Borneo); 28, scutum of female of *P. corporaali* Van Lith (Sumatra); 29—30, thorax and pygidial area of female of *P. varius* Van Lith (Malaya)

Tempora with mostly appressed silvery pubescence. Hairs on thorax more greyish than yellowish, long on propodeum, dense on mesosternum; epicnemial areas below with a round patch of dense, yellowish-grey pubescence. Pubescence on gaster yellowish, on margin of fourth and fifth sternites paler. Petiole with usual long, erect, hairs on sides.

As regards relationships, see remarks on *P. esuchus*.

Psenulus varius Van Lith

1962, Van Lith, Zool. Verh. Leiden 52: 69-70, ♂ (Malaya).

Two *Psenulus* females from Penang are supposed to belong to *P. varius*, but a male from this island should confirm the identification.

They are very similar to the male, differing only in a few minor details. Also third antennal segment yellow below. Marking of scutum almost the same (Fig. 29). Scutellum darker, base with black triangle pointing backwards, in one female somewhat reduced. Apparently this triangle is so much reduced in the males that only a small black spot on the posterior half is left. Only dorsal part of propodeum black, back except median groove yellow. Subalar area of fore wings black, below hind wings a small yellow spot.

A large round mark on anterior half of hypo-epimeral area yellow. A large yellow mark on mesopleura behind anterior plate. Fore and mid legs yellow. Fore side of hind femora brown. Apex of petiole dorsally not darkened.

Raised interantennal carina ending below antennae in a fine but distinct transverse carina. Antennae slender, third segment nearly three times, following segments about twice as long as broad at apex, gradually shortening, segments 10—11 about one and a half times as long as broad at apex, last segment about two and a half times as long as broad at base.

Back of propodeum with fine carination, on lower two thirds irregularly reticulate, on upper part almost obliquely striate. Apex of mid tibiae with a short oblique ridge behind which a small depression and three or four short red thorns. Second gastral sternite with indistinct triangular depression. Pygidial area narrow, lateral carinae almost parallel (Fig. 30).

Face with appressed silvery pubescence and also with many long silvery hairs. Epicnemial areas below with round patch of short yellowish-golden pubescence. Mesosternum with short yellowish-golden pubescence along median carina and also with dense, long and erect, whitish pubescence. Petiole with long and erect lateral hairs. Fourth and fifth gastral sternites, especially on apical margin, with dense and pale pubescence, sixth sternite with dense and short golden pubescence.

Length about 8,5—9 mm.

Malaya: 2 ♀ (allotype, 21 Jan., 1964), Penang, Tanjong Bungah, Sungei Kechil, 21 and 22 Jan., 1964, one with prey: a derbiid nymph (det. H. T. Pagden), coll. H. T. Pagden (coll. Pagden).

The male was provisionally placed in the group of *P. nigrolineatus*, but judging from the female characteristics and the lack of the metanotal projections in both sexes, this species seems to be more closely related to *P. esuchus*.

Psenulus pallidicollis spec. nov.

Female. — Head black; mandibles pale yellow, with reddish tips, palpi pale yellowish-brown, scape of antennae yellowish-white, partly brown above, flagellum dorsally black, underside brown. Thorax black except following yellowish-white parts: dorsal side of pronotum, pronotal tubercles, two parallel longitudinal marks on posterior half of scutum (Fig. 31), axillae, lateral wings of scutellum, and metanotum except the depressed lateral parts and a small brown mark on its hind margin. Tegulae reddish. Fore and mid legs including trochanters yellowish-white, underside of femora brownish and tarsi reddish. Hind legs including coxae reddish, tarsi brown. Veins of wings brown. Posterior surface of propodeum with four elongate, yellowish-white, marks. Gaster, including petiole and apical spine, reddish.

Clypeus convex, anterior margin depressed, indistinctly bidentate, distance between teeth about one fourth of total distance between eyes. Clypeal disk shining, with irregular puncturation. Raised interantennal carina narrow and sharp, ending below antennae in a fine transverse V-shaped carina. Frons and vertex smooth and shining, with fine piliferous punctures. Occipital carina normal. Apex of mandibles bidentate. Antennae long, third segment about three times as long as broad at apex, segments 4 and 5 about two and a half times and following segments about twice as long as broad at apex, last segment more than twice as long as broad at base.

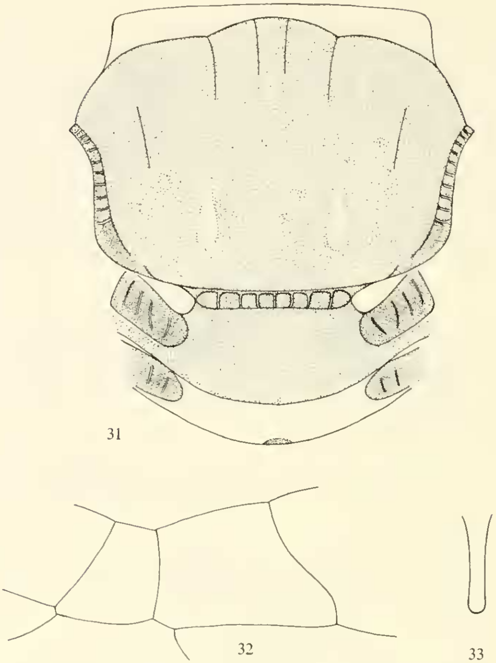


Fig. 31—33. Thorax, second and third submarginal cells of right fore wing, pygidial area of female of *P. pallidicollis* sp. nov. (Borneo)

Scutum finely and sparsely punctate, prescutal sutures distinct only on anterior third of scutum. Parapsidal sutures sharp. Enclosed area of propodeum concave, with oblique carinae, median depression heart-shaped. Longitudinal median groove on back of propodeum reaching about half-way, lower three-fourths of back of propodeum and posterior part of sides of propodeum with reticulate carination. Anterior oblique suture rather broad, especially lower part with strong and relatively long transverse carinae, upper part widened with a few weak transverse carinae.

Apical third of mid femora posteriorly with four short reddish thorns, anteriorly with a reddish, short and oblique, ridge and one short thorn at apex. Base of hind tibiae with a cluster of tiny reddish thorns. First recurrent vein of fore wings just ending in second submarginal cell, second recurrent vein ending in third submarginal cell (Fig. 32). Petiole cylindrical, long, reaching about as far as apex of hind femora, apex dorsally with a small triangular depression. Gaster very finely punctate. Pygidial area narrow, fine lateral carinae for greater part parallel (Fig. 33).

Face and tempora with silvery, appressed pubescence and also many long, raised, whitish hairs. Rest of head and thorax with long, whitish pubescence, somewhat yellowish on scutum, and dense on mesosternum. Epicnemial areas below with large, yellowish pubescent, circular area. Pubescence of gaster yellowish, posterior margin of fourth and fifth gastral sternites with dense and short, pale pubescence and sixth sternite with dense, backwardly directed and longer, golden pubescence.

Length about 11 mm.

Male unknown.

Borneo: 1 ♀ (holotype), Sarawak, Mt. Dulit, 4000 ft, Moss Forest, 29 Oct., 1932, Oxford Univ. Exp., B. M. Hobby and A. W. Moore (BM, 1933—254).

Apparently this wasp is closely related to *P. esuchus*, having a fine transverse carina below the antennae. It differs from the other species belonging to the group of *P. esuchus* in the darker scutum and the yellowish-white colour of the markings of thorax and legs.

Psenulus neptunus spec. nov.

Female. — Head black, mandibles yellow with dark tips, palpi yellowish-brown, anterior margin of clypeus dark reddish-brown, scape and first antennal segment yellow, flagellum pale reddish. Thorax yellow, with following black parts: three irregular longitudinal black marks on scutum, about as long as posterior three quarters and connected along posterior margin (Fig. 36), scutellar suture, enclosed area of propodeum and a small adjacent black mark on the sides, median longitudinal sulcus of propodeum and lower margin of back of propodeum, a black band on fore side of pronotum, interepicnemial area, mesosternum partly extending on lower part of mesopleura, a mark along posterior margin of mesopleura, and metapleura. Fore and mid legs including coxae yellow, tarsi somewhat reddish; hind legs reddish with yellow coxae. Gaster including petiole pale reddish. Veins of fore wings, except subcostal vein, yellowish-brown.

Disk of clypeus convex, anterior margin depressed, this depression about as broad as one fourth of length of clypeus, margin with two distinct teeth, distance between these teeth about one-fifth of total distance there between the eyes. Frontal carina raised, between antennae not broadened, ending in an arched transverse carina below antennae, about half as long as distance between the eyes (Fig. 34). Apex of mandibles bidentate. Antennae not clavate, third segment about two and one-third times and segments 9—11 about one and a half times as long as broad at apex, last segment twice as long as broad at base. Frons with very fine punctures from which fine appressed hairs arise, and with two converging lines each consisting of three strong punctures bearing a long hair, in front of anterior ocellus. Vertex with a few distinct punctures. Scutum with fine puncturation, intermixed with sparse, much larger, punctures. Scutellum and metanotum with fine punctures. Lateral depressions of scutellum and metanotum normal. Enclosed area of propodeum triangular, depressed, with oblique carinae. Back of propodeum with distinct oblique striation, upper part behind enclosed area almost smooth, sides with irregular reticulate carination. Anterior oblique suture weakly foveolate, widened upper part smooth. Legs normal, mid tibiae at apex with almost triangular flattened area bordered anteriorly by an oblique ridge, posteriorly by a few reddish spines and with two short spines at apical margin. Hind tibiae with a few reddish spines on apical margin. Second submarginal cell normal, first recurrent vein of fore wings almost interstitial, second recurrent vein ending in third submarginal cell (Fig. 35). Petiole cylindrical.

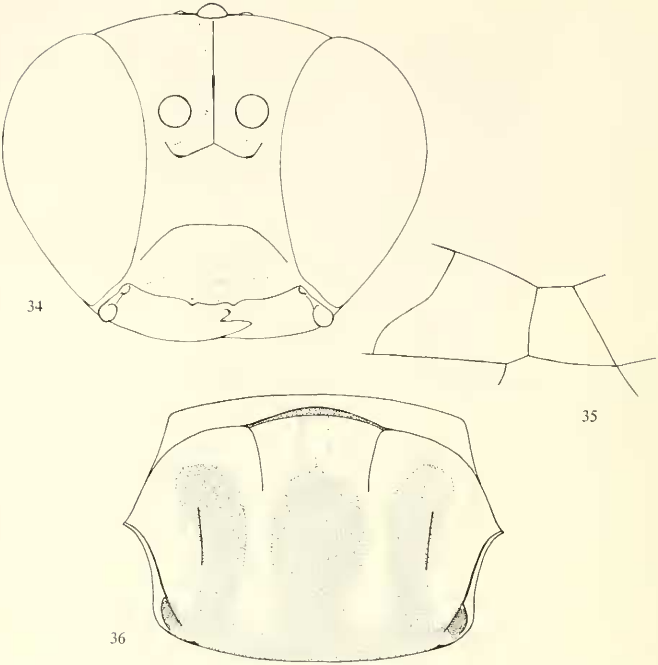


Fig. 34—36. Head, second and third submarginal cells of left fore wing, scutum of female of *P. neptunus* sp. nov. (Celebes)

Second gastral sternite without well-defined semi-elliptic depression. Pygidial area long and narrow, lateral carinae distinct.

Face and frons with pale golden, dense and short, not appressed pubescence, leaving sculpture visible, and with many long and erect hairs. Head and thorax with long greyish-golden hairs, gaster with shorter greyish-golden hairs. Epicnemial areas with a round patch of dense and short greyish-golden pubescence. Apical margin of fourth and fifth gastral sternites with dense, short, pale pubescence. Sixth sternite with dense, short, golden pubescence. Wings with yellowish-grey pubescence.

Length about 10 mm.

Male unknown.

Celebes: 1 ♀ (holotype), Ile Ile, 500—800 m, early Dec., 1930, coll. G. Heinrich (ZMB).

This species has been named *neptunus* because of the tridentate marking of the scutum.

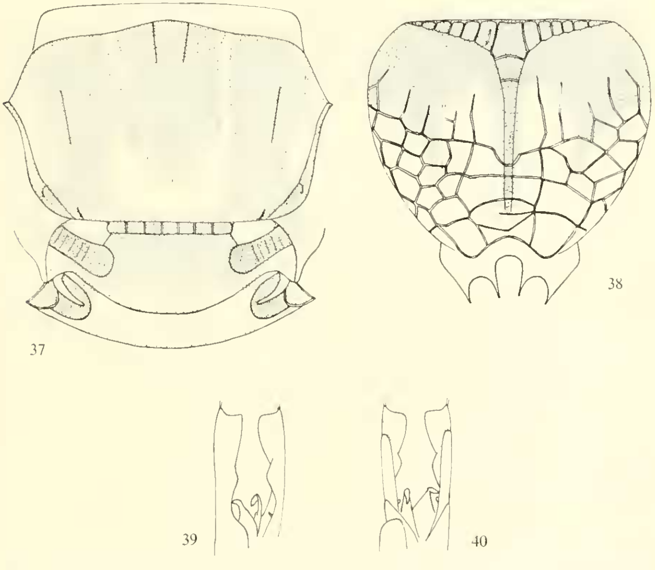
P. neptunus and *P. segrex*, both from Celebes and both with pale wing-veins, are similar in many respects. They belong to different species groups, however, as the transverse carina below the antennae is lacking in the female of *P. segrex*. Moreover, the pubescence of the face and the black marking of the scutum also differ.

Group of *Psenulus pseudajax*

Psenulus pseudajax holtmanni subsp. nov.

Two males from the Philippines differ slightly from the male of the nominate form from Central Java. The yellow marks of the scutum, along the tegulae, are longer but they do not reach the anterior margin of the scutum (Fig. 37). Scutellum black with yellow hind margin, in the male from Culion the yellow marking is more extended (Fig. 37). The four yellow marks on propodeum confluent on lower part (Fig. 38), whilst in the nominate form they are fully separated. Fore and mid legs completely yellow, only in the male from Busuanga base of fore femora with a small brown spot. Gastral sternites darkened. Genitalia: Fig. 39 and 40.

Pubescence and structure of head as in the male from Java. Antennae long, third segment about three and a half times as long as broad at apex, following segments gradually shorter, segments 10—12 nearly twice as long as broad at apex, last segment more than twice as long as broad at base. No tyloidea.



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39

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Fig. 37—40. Thorax, propodeum, genitalia in dorsal and ventral view of male of *P. pseudajax holtmanni* subsp. nov. (Culion)

Anterior oblique suture indistinctly foveolate, widened upper part with some weak transverse carinae. Anterior margin of scutum with a few large punctures.

As in the male from Java the first recurrent vein of the fore wings is interstitial, the metanotum has the same peculiar, long and narrow projections and the prescutal sutures are lacking. This latter characteristic is unusual in *Psenulus*. *P. pseudajax* certainly does not belong to the group of *interstitialis*, where it was provisionally placed in 1962, and has now been brought into a separate group.

Philippine Is.: 1 ♂ (holotype), Culion I., 6 km W of Culion, 9 June, 1962, Malaise trap; 1 ♂, Busuanga I., 4 km N of San Nicolas, 23—24 May, 1962, Brushes, both coll. H. Holtmann (BISH).

The male from Busuanga is somewhat darker, the scutellum being black with only a narrow yellow hind margin and the yellow marks on the propodeum are scarcely confluent.

Group of *Psenulus interstitialis*

Psenulus interstitialis interstitialis Cameron

1906, Cameron, Tijdschr. v. Ent. 49: 222-223, ♀ (*Psenulus ? interstitialis*; New Guinea).
1962, Van Lith, Zool. Verh. Leiden 52: 84-86, ♀ (*Psenulus interstitialis interstitialis*).

The females of *P. interstitialis*, recorded below, certainly belong to the nominate subspecies. They have all a completely yellow scutum, the metapleura are yellow, the extent of the black parts of the lateral depressions of the scutellum is variable, the enclosed area of the propodeum and the longitudinal sulcus are yellow or more or less black, and the median groove of the mesosternum is yellow, rarely with a complete black line. Anterior margin of clypeus reddish (Fig. 41, holotype). Veins of wings yellowish, but subcostal vein brownish. Antennae yellowish-red, dorsally brownish; third antennal segment about two and a half times, fourth and fifth segments about twice, sixth segment about one and three-quarters and segments 7—11 about one and a half times as long as broad at apex; last segment slightly more than twice as long as broad at base. Back of propodeum with fine oblique striation on upper part. Pygidial area: Fig. 42.

Male. — Differs little from female, but median groove of mesosternum usually black. Dorsal side of antennae pale or darker brown.

Distance between teeth on anterior margin of clypeus nearly one fifth or one sixth of the distance separating the eyes at that point. Interantennal carina ending below antennae in a distinct transverse carina, which is bilobed in frontal view. Antennae longer than in female, but scape shorter. Third antennal segment more than two and a half times, following segments about two and a half times as long as broad at apex; 13th segment about three times as long as broad at base; segments 8—12 somewhat rounded below, no distinct tyloidea. Posterior surface of propodeum and posterior part of sides of propodeum with coarse reticulate carination. Anterior oblique suture narrow, weakly foveolate, widened upper part smooth.

Pubescence of frons and vertex pale golden, below antennae silvery or very pale golden and appressed, also with many long erect hairs.

Genitalia: Fig. 43.

Length about 10 mm.

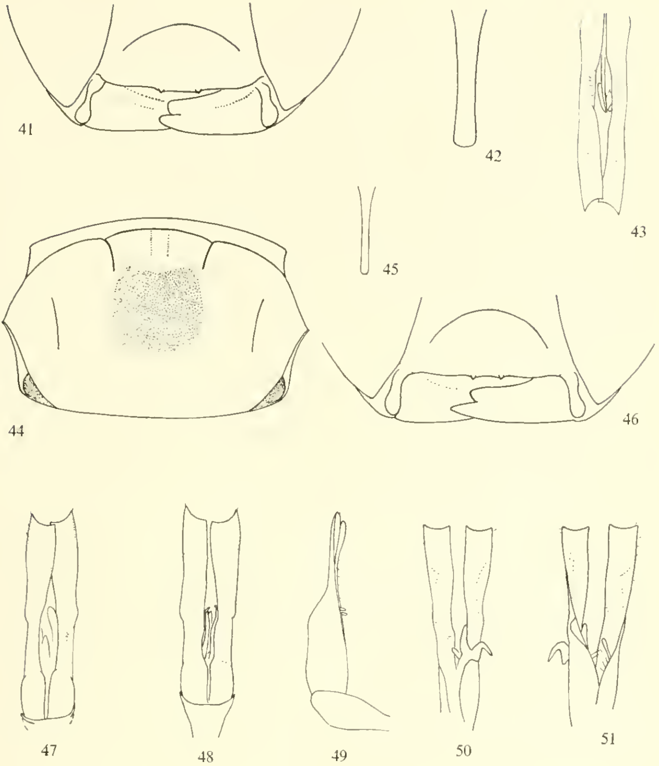

Fig. 41—51. Subspecies of *Psenulus interstitialis* Cameron. 41—42, clypeus and pygidial area of female (holotype) of nominate form from New Guinea; 43, genitalia of male of nominate form (E New Guinea); 44—46, scutum, pygidial area, clypeus of female of *P. interstitialis lutescens* (Turner) (NE Australia); 47—51, genital apparatus of male of *P. interstitialis salomonensis* subsp. nov. (Solomon Is.), 47, dorsal view (Guadalcanal), 48—49, dorsal and lateral view (Russell Is.), 50—51, dorsal and ventral view (Bougainville)

New records: NW New Guinea: 1 ♂ (allotype), Humboldt Bay, Hollandia, April, 1936, coll. L. E. Cheesman (BM, 1936—271); 1 ♀, Navire, S. Geelvink Bay, 1—20 m, 2—9 July, 1962, J. L. Gressitt and J. Sedlacek, Malaise trap (BISH); 1 ♀, Sorong, Kampong Malano, 28 Aug.—6 Sept., 1948, coll. M. A. Lieftinck (ML).

Central N New Guinea: 5 ♀, Idenburg River, Bernhard Camp, 50 m, July—Nov., 1938, coll. J. Olthof, Neth. Ind.-American New Guinea Exp. (ML and USNM).

Territory of New Guinea: 1 ♀, Finschhafen, 6 Oct., 1944, coll. E. S. Ross (CAS); 1 ♀ and 2 ♂, Huon Peninsula, Finschhafen, 80 m, 16 April, 1963, coll. J. Sedlacek (BISH); 1 ♀, Nadzab, 25 June, 1944, coll. U. N. Lanham (Coll. Krombein); 1 ♀, Nadzab, Markham River val., along east fork of Ngafir Creek, 13 Aug., 1944, coll. K. V. Krombein (Coll. Krombein).

Papua: 1 ♀, Kokoda, 1200 ft, April, 1933, coll. L. E. Cheesman (BM); 1 ♀, Cape Rodney, 2 Nov., 1960, coll. J. L. Gressitt, Malaise trap; 1 ♀, Daru I., 2 m, 24—25 Oct., 1960, coll. J. L. Gressitt, Malaise trap; 1 ♀, Owen Stanley Range, Goilala, Loloipa, 16—30 Jan., 1958, coll. W. W. Brandt; 1 ♂, W District, Oriomo Govt. Station, 26—28 Oct., 1960, J. L. Gressitt, Malaise trap (BISH).

Some females and males from New Guinea, even those collected at the same locality as the normal form, and also two females from Japen Island, are darker than the holotype. Scutum with black mark in the middle, metapleura and median groove of mesosternum more or less black. Enclosed area of propodeum and median sulcus on back of propodeum almost completely black. The antennae of the females are of normal length. Provisionally, I consider these darker specimens as a variety of the nominate form. The black mark on the scutum is similar to that of the NE Australian subspecies *lutescens* Turner, but in the latter form the metapleura are completely yellow, at least in the four females which I have studied. Moreover, the distance between the teeth on the clypeal margin is larger, about one-fifth of the distance separating the eyes at that point, while in *lutescens* it is about one-seventh.

NW New Guinea: 1 ♂, Nabire, S Geelvink Bay, 16 Sept., 1962, in jungle, coll. H. Holtmann, Malaise trap (BISH).

Japen Island: 2 ♀, Mt. Baduri, 1000 ft, Aug., 1938, coll. L. E. Cheesman (BM, 1938—593).

Territory of New Guinea: 1 ♂, Finschhafen, 15 April, 1963, coll. J. & M. Sedlacek, 1 ♀ and 1 ♂, Wau, 1250 m, 4 May, 1965, coll. J. Sedlacek; 1 ♂, Wau, 1200 m, 10 Sept., 1964, coll. J. & M. Sedlacek; 1 ♂, Wau, 1190 m, 11 Sept., 1964, coll. M. Sedlacek, Malaise trap; 1 ♂, Karimui, 1080 m, 8—13 July, 1963, coll. J. Sedlacek, light trap (BISH).

SE New Guinea: 1 ♂, Popondetta, 60 m, 30—31 Aug., 1963, coll. J. Sedlacek, Malaise trap (BISH); 1 ♂, Kapakapa, May—June, 1891, coll. L. Loria (MCG).

Psenulus interstitialis lutescens (Turner)

1907, Turner, Ann. Mag. Nat. Hist. 19 (7): 273, ♀ (*Psen lutescens*; Australia, Queensland).
1908, Turner, Proc. Zool. Soc. London 30: 463 (*Psenulus interstitialis*).
1916, Turner, Ann. Mag. Nat. Hist. 17 (8): 128 (*Neofoxia interstitialis*).

A year after its publication *P. lutescens* was considered by its author as a synonym of *P. interstitialis* Cameron.

I have seen the type (No. 21.838) from Mackay and also three females from Cairns, all from the collection of Turner in the British Museum (Natural History) and there is no doubt that they are closely related to *P. interstitialis* from New Guinea.

Although the subspecies of *P. interstitialis* are all somewhat variable, I provisionally consider *lutescens* as a distinct subspecies. The distance between the two teeth on the anterior margin of the clypeus is smaller, viz about one-seventh of the total distance there between the eyes (Fig. 46), as against about one-fifth in the nominate subspecies.

Scutum with large square mark in the middle (Fig. 44), scutum of nominate subspecies being usually completely yellow. Lateral depressions of scutellum for the greater part black. Metapleura yellow, as in the nominate subspecies. No broad black line on mesosternum. Enclosed area of propodeum not fully black, in the holotype even completely yellow. Veins of wings yellowish. Pygidial area: Fig. 45.

Length about 9,5 mm.

Male unknown.

NE Australia: 1 ♀ (holotype), Mackay, Dec., 1900 (12.00); 2 ♀, Cairns, Kuranda, Nov., 1901 (11.01) and Febr., 1902 (2.02), Turner Coll. 1909—49; 1 ♀, Kuranda, 1100 ft, 30 May, 1913, coll. R. E. Turner 1913—438 (BM).

More material should be studied to find out whether the smaller distance between the clypeal teeth and the black marking of the scutum are constant characteristics. A form from New Guinea with similar marking on the scutum is perhaps a variety of the nominate subspecies. It differs from *lutescens* not only by the larger distance between the clypeal teeth, but also by its darker metapleura.

Psenulus interstitialis salomonensis subsp. nov.

The form of *P. interstitialis* from the Solomon Islands differs from the New Guinean forms in the yellowish-red, instead of yellow, colour of the thorax. In the female also the fore and mid legs are darker. Only the mandibles and the scape of the antennae are paler yellow. Flagellum of antennae yellowish-brown, in the male somewhat darkened apically.

Scutum without black mark in the middle. Metapleura pale yellowish-red in female, metapleura of male either pale yellowish-red or more or less black. Extent of black colour in enclosed area of propodeum somewhat variable. Depressed lateral parts of scutellum black, of metanotum yellow. Median groove of mesosternum more or less black. Hind margin of scutum of male black. Veins of wings yellowish-brown.

In both sexes frons and vertex flatter than in the New Guinean and NE Australian forms. Distance between clypeal teeth about one-fifth of total distance there between the eyes. Anterior oblique suture almost linear, widened upper part smooth. Face with silvery appressed pubescence and also a number of long, erect, hairs. Pubescence of rest of body yellowish-brown.

Female. — Upper part of posterior surface of propodeum almost smooth, indistinctly transversely striate. Antennae similar to those of the nominate subspecies. Third segment about two and a half times as long as broadest part at apex, segments 4—6 about twice as long, segments 9—11 about one and a half times as long as broad at apex, last segment about twice as long as broad at base. Posterior margin of fourth and fifth gastral sternites with short and dense whitish pubescence.

Length about 8—9 mm.

Male. — Posterior surface of propodeum with coarse and irregular carination. Antennae long, as in the nominate form, but last segment slightly shorter, less than three times as long as broad at base. Segments 8—11 slightly rounded below, no distinct tyloidea. Genitalia: Fig. 47—51.

Length about 7,5—8 mm.

Solomon Is.: 1 ♀ (holotype) and 1 ♂ (allotype). Guadalcanal I., Tenaru R., Jan., 1945, coll. G. E. Bohart (CAS); 1 ♀, Tambalia, 30 km W of Honiara, 22 May, 1964, coll. R. Straatman (BISH).

Malaita I.: 1 ♂, Dala, 50 m, 6—13 June, 1964, coll. J. and M. Sedlacek, Malaise trap (BISH).

Russell Id.: 3 ♀ and 1 ♂, Pavuvu I., Pepesala, 0—100 m, 18—20 July, 1964, coll. R. Straatman, Malaise trap (BISH).

Kolombangara I.: 1 ♀, Pepele, 30 m, 7 Febr., 1964, coll. P. Shanahan, Malaise trap (BISH).

Vella Lavella I.: 1 ♀, Ulo Crater, 10 m, Dec., 1963, Malaise trap (BISH).

Bougainville I.: 1 ♂, Naval Air Base, 25 April, 1945, coll. G. E. Bohart (USNM).

Psenulus chariis spec. nov.

Female. — Head black; mandibles yellow with dark tips, palpi yellowish, anterior margin of clypeus reddish, scape of antennae yellow, flagellum reddish-yellow. Thorax black with following yellow parts: pronotum above, pronotal tubercles, sides of scutum and two incomplete median lines (Fig. 52), scutellum except depressed lateral parts, metanotum and part of its lateral depressions, two parallel lines on posterior surface of propodeum, sides of propodeum, upper part of anterior plate of mesepisternum, a posteriorly somewhat vague semicircular band on mesopleura and almost complete hypoepimeral area. Axillae black with small yellowish-red dot. Fore and mid legs including coxae dark yellow, hind legs including coxae, and gaster including petiole, yellowish-red. Veins of wings yellowish-red, subcostal vein slightly darker.

Anterior margin of clypeus resembling that of *P. interstitialis interstitialis*, with two small teeth. Raised part of interantennal carina not broadened dorsally. No distinct transverse carina below antennae, only traces laterally. Frons and vertex shining, almost impunctate, lateral parts of frons slightly raised. Occipital carina ending in hypostomal carina. Third segment of antennae about two and a half times as long as broad at apex, fourth segment nearly twice, segments 8—11 about one and a half times as long as broad at apex, 12th segment about twice as long as broad at base.

Scutum finely, sparsely, punctate, also with a few larger punctures, scutellum and metanotum finely, sparsely, punctate. Enclosed area of propodeum depressed, with oblique longitudinal carinae. Upper part of back of propodeum smooth, posterior surface with fine carination which is partly obliquely parallel, sides of propodeum with fine reticulate carination. Longitudinal sulcus of propodeum about as long as upper two thirds of propodeum. Mesopleura finely punctate. Anterior oblique suture indistinctly foveolate, widened upper part smooth. First recurrent vein of fore wings about interstitial. Femora thick, apex of mid tibiae with oblique ridge and a few short reddish thorns. Apex of hind tibiae with three short reddish spines, close together. Petiole about as long as hind tibiae, cylindrical. Pygidial area as in the nominate form of *P. interstitialis*.

Face with appressed silvery pubescence and a number of long erect hairs, rest of body yellowish-grey pubescent. Sides of petiole with long erect hairs. Epicnemial areas below with a round patch of appressed silvery pubescence. Hind margin of fourth and fifth gastral sternites with dense and short, whitish, pubescence.

Length about 8,5 mm.

Male unknown.

Solomon Is.: 3 ♀ (holotype and 2 paratypes), Choiseul I., Malangona, 30 m, 14 March, 1964, Malaise trap, coll. P. Shanahan (BISH).

Structurally this wasp is close to *P. interstitialis*. It is the second known representative of this group in the Solomon Islands. The extent of the black marking of the scutum resembles that of some of the Philippine species belonging to this group. The wing veins, however, are yellowish-red, as in its near relatives from New Guinea and north-eastern Australia, which have a much more yellow coloured scutum.

Psenulus araucarius spec. nov.

A single female from Central New Guinea differs structurally so much from *P. interstitialis* Cameron that it seems justified to describe it as a new species.

Scutum with square black mark. Outer two-thirds of lateral depressions of scutellum black; depressions of metanotum yellow. Enclosed area and longitudinal sulcus of propodeum not completely black. Metapleura with black streak. Dorsal side of antennae dark brown, ventral side yellowish-red. Veins of fore wings yellowish, subcostal vein darker.

Antennae longer, third segment more than three times as long as broad at apex (in *P. interstitialis* about two and a half times as long as broad) and fourth and fifth segments about two and a half times as long as broad (in *P. interstitialis* about twice as long as broad), segments 9—11 nearly twice as long as broad at apex, last segment more than twice as long as broad at base. Distance between clypeal teeth large, nearly one-fifth of total distance there. Pygidial area much broader at base (Fig. 53, *araucarius*; Fig. 42, holotype of nominate subspecies). Base of hind tibiae dorsally smooth and flattened, this area margined by a horseshoe-shaped line of small blunt thorns. Usually this area is not flat and thorns are irregularly placed. In some *P. interstitialis* from NE New Guinea the structure of the tibial base resembles that of *P. araucarius*.

As in *P. interstitialis*, the anterior oblique suture is linear, the widened upper part smooth.

Pubescence of face pale golden, mostly appressed but also with long, erect, hairs. Posterior margin of fourth and fifth gastral sternites with dense and short pale pubescence.

Length about 9 mm.

Male unknown.

Central N New Guinea: 1 ♀ (holotype), Sahuweri River Area, Araucaria River Valley, Araucaria Camp, 800 m, March, 1939, coll. L. J. Toxopeus, Neth. Ind.-American New Guinea Expedition (ML). The right antenna is missing.

This specimen, already labelled by Dr. Karl V. Krombein "new species", is easily distinguished by the wider pygidial area and by the much longer antennae.

Psenulus segrex spec. nov.

Female. — Resembling *P. interstitialis*. Anterior margin of clypeus reddish-brown. Scape and following segment of antennae yellow, flagellum reddish. Scutum yellow, marking resembling that of *P. luzonensis:* a large square central black spot, connected by a narrow line with the black triangle on the posterior margin of the scutum; along the parapsidal sutures a narrow, longitudinal, black streak, about as long as the central

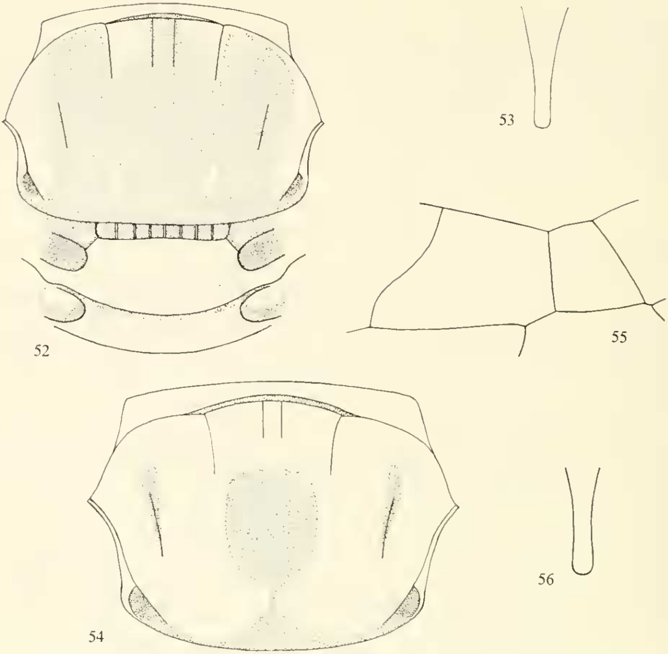

Fig. 52-56. Species of Oriental *Psenulus*. 52, thorax of female of *P. chariis* sp. nov. (Solomon Is.); 53, pygidial area of female of *P. araucarius* sp. nov. (New Guinea); 54—56, scutum, second and third submarginal cells of left fore wing, pygidial area of female of *P. segrex* sp. nov. (Celebes)

spot (Fig. 54). Scutellum and axillae yellow, lateral depressions black. Metanotum yellow, inner third of lateral depressions black. Propodeum yellow, enclosed area and median longitudinal sulcus black. Pronotum yellow, lower part and a mark against anterior margin of epicnemial areas black. Mesosternum black, marking roundly dilated on to lower part of sides of thorax, which are yellow, including hypo-epimeral and subalar areas and anterior plate of mesepisternum. Hind margin of mesopleura and the whole metapleura black.

Fore and mid legs yellow, including coxae, but fore tarsi and mid tibiae and tarsi reddish. Hind legs reddish except coxae which are yellow. Subcostal vein of fore wings brown, other veins and stigma yellow or yellowish-brown. Tegulae yellow. Gaster including petiole reddish, apex of petiole dorsally slightly brown.

Face without transverse carina below antennae. Distance between clypeal teeth less than one-fifth of total distance there between the eyes. Third antennal segment about two and a half times as long as broad at apex, 10th and 11th segments about one and a half times as long as broad at apex, last segment more than twice as long as broad at base. Upper part of propodeum with distinct oblique striae, lower part with more irregular carination. Anterior oblique suture almost linear, widened part smooth. Base of hind tibiae flattened on dorsal side and with horseshoe-shaped row of nine small, dark red teeth; apical margin with three small, dark red, teeth. First recurrent vein of fore wings ending a short distance before the end of the first submarginal cell (Fig. 55). Pygidial area narrow (Fig. 56). Second gastral sternite with semi-circular, not well-defined, depression.

Pubescence of face pale golden. Body with yellowish pubescence, posterior margin of fourth and fifth gastral sternites with short and dense whitish pubescence.

Length about 10,5 mm.

Male unknown.

Celebes: 1 ♀ (holotype), Bonthain, Wawa Karaeng, 1100 m, Sept.—Oct., 1931, coll. G. Heinrich (ZMB).

P. segrex and *P. lamprus* were collected simultaneously, at an altitude of 1100 meters.

P. segrex is closer to *P. interstitialis* Cameron, which also has yellow veins (except the subcostal vein) and stigmata, whilst *P. lamprus* seems to be more related to the Philippine forms of the *P. interstitialis* group, which have brown veins and stigmata.

It seems possible that the two species from Celebes are what L. J. Toxopeus called a "species duplex", but very few specimens could be studied and more material from this island is needed.

Psenulus luzonensis luzonensis (Rohwer)

1921, Rohwer, Phil. Jl. Sc. 18 (3): 313-314, ♀ (*Diodontus luzonensis*; Luzon).

1962, Van Lith, Zool. Verh. Leiden 52: 86-87, ♀ and ♂ (*Psenulus interstitialis luzonensis*; Luzon, Biliran, Negros).

1970, Van Lith, Steenstrupia 1: 100-101 (Tawi Tawi).

New records from the Philippine Islands: Luzon: 1 ♀ and 3 ♂, Atimonan, Quezon, July and August, 1908, coll. Micholitz (ZMB); 1 ♀, Antipolo, Rizal, 6 Sept., 1952, coll. Townes family (Coll. Townes); 1 ♀, Mt. Isarog, Camarines Sur, 500 m, 4 April, 1963, coll. H. M. Torrevillas (BISH); 1 ♀, Cuenca, Batangas, 29 Jan., 1954, coll. Macabasco (BPIM); 1 ♀, Bigti, Bulucan, 26 Sept., 1961, coll. C. Baltazar (BPIM); 1 ♂, Mt. Montalban, Wa-Wa Dam, Rizal, 150—200 m, 10 March, 1965, coll. H. M. Torrevillas (BISH); 1 ♀, Sierra Madre, Nuevacija, March, 1965, coll. A. Villareal (CNC).

Mindanao: 1 ♀, Parang, Cotabato, 16 June, 1953, coll. Henry Townes (Coll. Townes). First record from Mindanao.

There is some variation in the extent of the black marking of the thorax. The female from Mindanao has two small, lateral, comma-shaped, black marks. In the females from Mt. Isarog and from Antipolo the scutum has only one median square spot. In the female from Bigti the median spot on the scutum is reduced to two small, narrowly separated, oblong marks, well between prescutal sutures, if these would be continued. Also the black marking of the mesopleura, ventral side of thorax and of the depressed lateral parts of the scutellum is variable.

The pubescence of the clypeus is always silvery; of the frons distinctly pale golden in the Luzon females, pale yellow in the female from Mindanao.

Psenulus luzonensis pseudolineatus Van Lith

1962, Van Lith, Zool. Verh. Leiden 52: 88, ♂ (Palawan, Philippine Is.).
1970, Van Lith, Steenstrupia 1: 101, ♂ (Balabac, Philippine Is.).

New record from Palawan: 1 ♂, 3 km NE of Tinabog, 12 May, 1962, coll. H. Holtmann, Malaise trap (BISH).

This is the second record of a male belonging to this subspecies. The hind femora are light brown, base not darkened, as in the holotype. A narrow line connects median black mark of scutum with broad black hind margin (Fig. 57). Depressed lateral parts of scutellum black, only the inner part of the depressed lateral areas of metanotum is black. Veins of wings brown.

Third antennal segment about two and a half times and segments 4—8 about twice as long as broad at apex, following segments somewhat shorter, last segment longer than twice as broad at base. Segments 8—12 somewhat rounded below.

Anterior oblique suture narrow, foveolate, widened upper part smooth.

Psenulus luzonensis davanus (Rohwer)

1923, Rohwer, Phil. Jl. Sc. 22 (6): 599, ♂ (*Diodontus davanus*; Mindanao).
1962, Van Lith, Zool. Verh. Leiden 52: 87-88, ♀ and ♂ (*Psenulus interstitialis davanus*; Mindanao and Mindoro).

This subspecies is now also recorded from the Philippine island Balabac: 1 ♀, 10 km S of Balabac, 26 May, 1962, coll. H. Holtmann, Malaise trap (BISH).

Anterior oblique suture narrow, weakly foveolate, widened upper part smooth and shining. Second gastral sternite without semicircular depression. The dense, appressed pubescence of clypeus and tempora is silvery-white, pubescence of frons pale golden.

Psenulus lamprus spec. nov.

Two *Psenulus* females from Celebes resemble *P. interstitialis* from New Guinea. The thorax is yellow, including lower part of pronotum, but except a black triangle on posterior margin of scutum, black scutellar suture and two small dark spots in the enclosed area of the propodeum. Anterior margin of clypeus reddish. Scape of antennae and following segment yellow, flagellum yellowish-red, only slightly darkened on upper side. Unlike the forms from New Guinea and NE Australia, the veins of the wings are brown, instead of yellowish. All coxae, fore legs, and trochanters, femora and tibiae of mid legs yellow. Mid tarsi and hind legs including trochanters yellowish-red. Gaster including petiole yellowish-red.

Distance between teeth on anterior margin of clypeus as in *P. interstitialis*. Third antennal segment about two and a half times as long as broad at apex, fourth segment twice as long, segments 5—8 about one and a half times, segments 9—11 little longer than they are broad at apex, last segment about twice as long as broad at base. Back of propodeum, and sides except anterior margin, with dense and rather coarse reticulate carination, upper half with parallel oblique striae. Anterior oblique suture narrow, weakly foveolate, widened upper part smooth and shining. Apex of hind tibiae with three small reddish spines. First recurrent vein of fore wings interstitial. Petiole cylindrical. Pygidial area narrow.

Pubescence of face and frons very pale golden, almost silvery, rest of body yellowish-grey, posterior margin of fourth and fifth gastral sternites with short and dense, whitish, pubescence.

Length about 9 mm.

Male unknown.

Celebes: 1 ♀ (holotype), Bonthain, Wawa Karaeng, 1100 m, end Aug., 1931; 1 ♀ (paratype), Bantimurung, Aug., 1931, both coll. G. Heinrich (holotype ZMB, paratype in the author's collection).

This species is easily distinguished from *P. interstitialis* from New Guinea and NE Australia by the completely yellow lower part of the pronotum and by the brown veins of the fore wings. This latter character may point to a close relationship with the Philippine forms, which all have brown wing veins, but which have more extended black markings on the scutum and rest of the thorax.

Psenulus annamensis spec. nov.

Female. — Head black; labrum reddish, mandibles yellow with red tips, palpi yellowish, scape of antennae yellow, flagellum black-brown above, reddish below. Thorax black; the following parts yellow: pronotum dorsally, pronotal tubercles, a band along lateral margins of scutellum almost reaching anterior margin, two median lines on scutum (Fig. 58), scutellum and metanotum including postero-lateral margins but except a small black mark on posterior margin of scutellum and the black lateral depressions, two large longitudinal marks on posterior face of propodeum, similar marks on the sides, their upper parts vaguely connected with the inner marks, upper third of anterior plate of mesepisternum, a vague spot on the mesopleura behind the anterior oblique suture. Axillae black but with a very small reddish spot in the hind corner. Fore and mid legs yellow including greater part of coxae, tarsi somewhat reddish, hind legs reddish but coxae yellow and trochanters brown, outer spur of hind tibiae yellowish. Petiole reddish, apex darkened, gaster reddish. Tegulae yellow. Veins of wings dark brown.

Protruding median part of anterior clypeal margin almost straight, a small tooth on the corners, distance between the teeth less than one-fifth of total distance there between the eyes; disk of clypeus indistinctly punctate. Frons and vertex with minute punctures. Interantennal carina raised, narrow, no transverse carina below antennae. Third antennal segment more than three times, segments 4—6 more than two times as long as broad at apex, following segments gradually shorter, 11th segment about one and a half times as long as broad at apex; last segment more than twice as long as broad at base. Legs normal, apex of mid tibiae somewhat depressed longitudinally, this depression margined anteriorly by an oblique ridge, posteriorly by three red thorns. Apex of hind tibiae with three short red thorns. First recurrent vein of fore wings interstitial, second recurrent vein ending well in third submarginal cell. Petiole long, cylindrical. Gaster with very fine punctures, pygidial area long and narrow, carinae on apical half parallel. Second gastral sternite with indistinct semi-elliptic depression.

Face with appressed silvery pubescence and also with long and erect hairs. Rest of body yellowish-grey pubescent, densest on mesosternum. Epicnemial areas below with circular pubescent spot. Hind margin of fourth and fifth gastral sternites and disk of sixth sternite with dense pubescence.

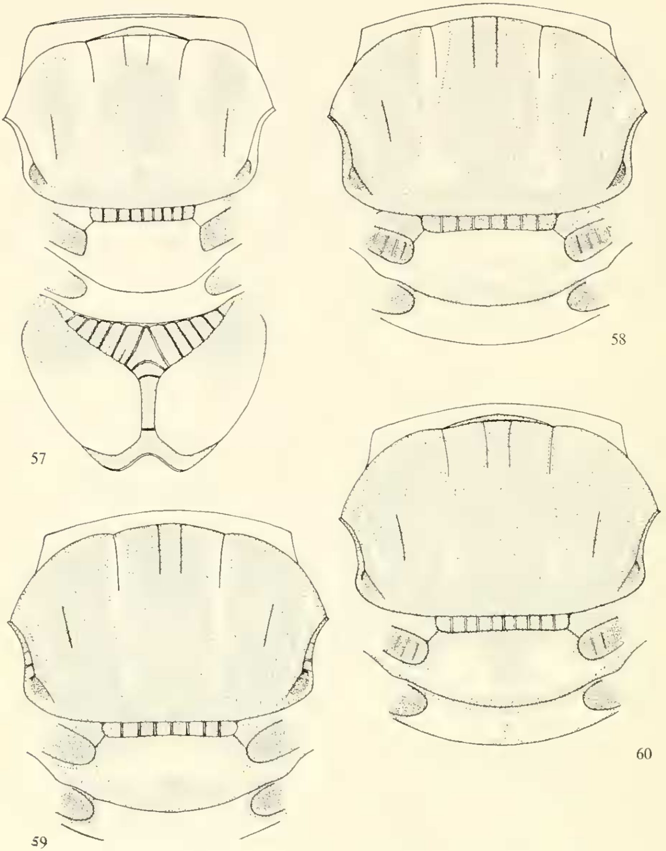

Fig. 57—60. Species of Philippine and South Asiatic *Psenulus*. 57, thorax of male of *P. luzonensis pseudolineatus* Van Lith (Palawan); 58, thorax of female of *P. annamensis* sp. nov. (Vietnam); 59, thorax of female of *P. annamensis* subsp. ? (India, Sikkim); 60, thorax of female of *P. annamensis* subsp. ? (S India)

Length about 9,5 mm.

Male unknown.

Vietnam: 1 ♀ (holotype), Dai Lanh, N of Nha Trang, 30 Nov.—5 Dec., 1960, coll. C. M. Yoshimoto (BISH).

This female is closely related to *P. elegans* (Van Lith, 1962) from Java, which has been placed in the group of *P. interstitialis*. However, the axillae of *P. elegans* are yellow and its scutellum is largely black. Unfortunately the female of the Java form is unknown. It would be interesting to know the length of its antennal segments, as in the forms from the southeastern Asiatic continent the third antennal segment is longer than in the closely related *P. peterseni* (Van Lith, 1970) from the Philippines and most of the other Indo-Australian species of the group of *P. interstitialis*.

A female from Sikkim is very similar. It differs in the somewhat larger size, the yellow lines on the scutum are narrower (Fig. 59), the yellow spot on the anterior plate of the mesepisternum is smaller, the mesopleura are completely black, the fore side of the hind femora is dark brown and the posterior surface of the hind femora is yellowish.

Length about 10,5 mm.

India: 1 ♀, Sikkim, coll. Bingham (ZMB).

Another female, from S India, is also very similar and closely related. Scutum and scutellum are slightly darker than in the form from Vietnam (Fig. 60), the marks on posterior surface and sides of propodeum are fused into two large square marks, fore and mid femora have a large brown streak on hind surface, mid tibiae are brown, hind legs dark brown except a yellowish streak on hind surface and paler base of tibiae. Sides of thorax black except a vaguely defined small yellow spot on the upper part of the hypoepimeral area. Axillae with a very small yellowish spot.

I expect that this will prove to be a different subspecies, either of *P. elegans* or of *P. annamensis*. Before definitely naming this Indian form more specimens from this area should be available.

S India: 1 ♀, Nilgiri Hills, Devala, 3200 ft, Oct., 1960, coll. P. Susai Nathan (ML).

Psenulus hoozanius spec. nov.

Male. — Head black; mandibles yellow except dark tips, palpi straw-yellow, scape of antennae yellow, dorsally with brown streak, second and following antennal segments dorsally dark brown, underside pale yellowish-brown, but underside of last five segments light brown. Thorax black with following yellow parts: dorsal part of pronotum, pronotal tubercles, a narrow mark on scutum (Fig. 61) along the tegulae, two small marks near hind margin of scutum, two irregular marks on scutellum, metanotum except lateral depressions, two parallel elongate marks on posterior side of propodeum. Fore side of fore coxae and complete trochanters pale yellow, femora, tibiae and tarsi darker yellowish. Mid trochanters pale yellow, tips of coxae, femora, tibiae and tarsi darker yellowish. Hind coxae yellowish-brown with dark brown triangle, rest of hind legs dark brown, ventrally somewhat paler, tibiae with yellowish base, tarsi dark brown. Veins of wings brown. Petiole pale reddish with darkened apical part and brown ventral plate; rest of gaster reddish, apical spine dark brown.

Clypeus convex with coarse coriaceous sculpture including the distinctly depressed margin, which is bidentate. Raised part of interantennal carina narrow dorsally, ending in transverse carina below antennae. Frons and vertex smooth and shining, almost impunctate. Occipital carina ending normally in hypostomal carina. Antennae slender, third segment about two and a half times as long as broad at apex, fourth segment twice, segments 5—9 slightly more than twice, segments 10—12 about twice as long as broad at apex, last segment nearly three times as long as broad at base. No tyloidea.

Scutum with fine, wide-spread, puncturation and a few larger punctures. Scutellum and metanotum almost impunctate. Enclosed area of propodeum depressed, with oblique

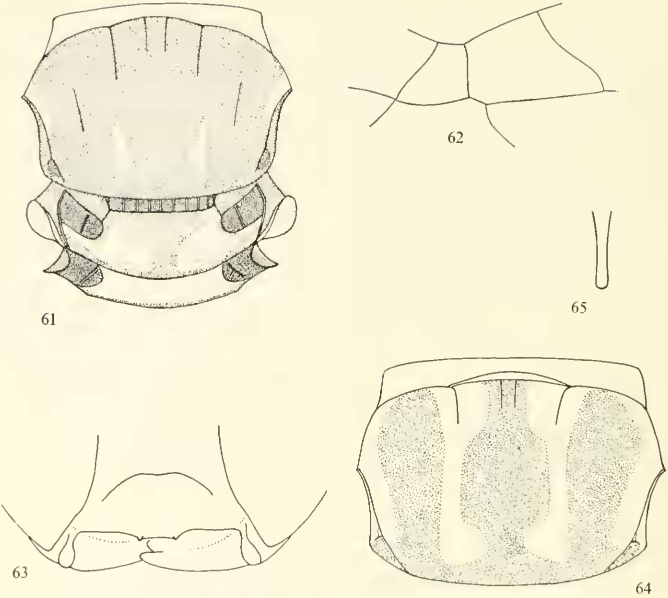

Fig. 61—65. Species of Oriental *Psenulus*. 61—62, thorax, second and third submarginal cells of right fore wing of male of *P. hoozanius* sp. nov. (Formosa); 63—65, clypeus, scutum, pygidial area of female of *P. ceylonicus* sp. nov. (Ceylon)

longitudinal carinae. Median longitudinal sulcus of propodeum as long as upper two-thirds of propodeum, upper third of hind surface of propodeum smooth, lower two-thirds of back and greater part of sides of propodeum with irregular carination. Mesopleura finely punctate, metapleura very smooth. Anterior oblique suture foveolate, with long transverse carinae, widened upper part smooth. Legs slender. First recurrent vein of fore wings interstitial, second recurrent vein ending well in third submarginal cell (Fig. 62). Gaster slender, finely punctate, petiole cylindrical.

Face with appressed silvery pubescence and a few longer, erect, greyish hairs. Rest of body with greyish pubescence, mesosternum with long whitish pubescence.

Length about 8 mm.

Female unknown.

Formosa: 1 ♂ (holotype), Hoozan, Oct., 1910, coll. H. Sauter (ZMB).

P. hoozanius has been placed provisionally into the group of *P. interstitialis*. A study of the female necessary to obtain more knowledge about its relationships. In comparison with the Philippine species of this group the thorax is darker.

Psenulus ceylonicus spec. nov.

Female. — Head black, mandibles yellow with dark tips, palpi yellowish. Scape of antennae yellow, flagellum dark brown above, pale brown below. Dorsal side of pronotum and pronotal tubercles yellow. Scutum yellow, two broad black lateral lines reaching pronotum anteriorly, posteriorly connected with black hind margin of scutum, median black line complete (Fig. 64). Tegulae yellowish transparent. Scutellar suture black; scutellum, axillae and metanotum yellow, lateral depressions of scutellum black, inner third of lateral depressions of metanotum black. Propodeum yellow with broad, black, basal band (as broad as enclosed area), black sulcus and narrow black posterior margin. Ventral part of thorax and epicnemial areas black, mesopleura black with yellow spot against lower part of anterior oblique suture; anterior plate of mesepisternum yellow, hypo-epimeral area yellow, subalar area of fore wings black. Metapleura black. Fore and mid legs including coxae yellow. Coxae of hind legs yellow, trochanters brown, femora yellowish-red, dorsal side brown, tibiae reddish-brown but extreme base and apex darkened, hind metatarsus dorsally brown. Veins of wings brown. Basal half of petiole yellowish-red, apical half black. Rest of gaster, including ventral plate of petiole, reddish.

Clypeus slightly convex and finely punctate, broad margin depressed, almost impunctate and shining, distinctly bidentate, distance between teeth about one-fifth of distance between eyes (Fig. 63). No transverse carina below antennae, interantennal carina sharp, strongly protruding between antennae, frons and vertex very finely punctate. Apex of mandibles bidentate. Antennae somewhat clavate, third segment more than two and a half times as long as broad at apex, segments 4—6 about twice and segments 7—9 about one and a half times as long as broad at apex, segments 10—11 slightly shorter, 12th segment about twice as long as broad at base.

Scutum sparsely punctate, prescutal sutures distinct on anterior third of scutum. Enclosed area of propodeum triangular, behind enclosed part a large smooth and shining area. Back of propodeum finely, irregularly, reticulate. Anterior oblique suture foveolate, widened upper part smooth. First recurrent vein of fore wings ending just before second submarginal cell, almost interstitial. Second recurrent vein ending in third submarginal cell.

Petiole almost cylindrical. Gaster with extremely fine punctatioon. Pygidial area narrow, broadest at base and middle part slightly narrower than apex (Fig. 65).

Pubescence of face silvery, also of frons below ocelli and on temples. Rest of body with whitish pubescence, posterior margin of fourth and fifth gastral sternites with short and dense, whitish, pubescence. Epicnemial areas below with circular pubescent spot. Mesosternum densely pubescent medianly.

Length about 9 mm.

Male unknown.

Ceylon: 2 ♀ (holotype and paratype), Kandy, June, 1918, coll. O. S. Wickwar (BM 1919—252).

In the paratype the lateral black bands on the scutum are slightly broader than in the holotype; the yellow parts of the paratype are discoloured.

P. ceylonicus differs from a similar S Indian form (cf. *P. annamensis*), in having the thorax more yellow, especially the sides.

Psenulus bakeri bakeri (Rohwer)

1921, Rohwer, Phil. Jl. Sc. 18 (3): 312-313, ♀ (*Diodontus bakeri*; Luzon).
1962, Van Lith, Zool. Verh. Leiden 52: 98-99, ♀ and ♂ (*Psenulus bakeri bakeri*; Luzon, Mindanao, Samar).

New records: Luzon: 1 ♂, Los Baños, Laguna, 29 Nov., 1952, coll. Townnes family (Coll. Townes); 1 ♀, Mt. Makiling, Laguna, 8 Nov., 1954, coll. C. Baltazar, 1 ♀, Tiaong, Quezon, 8 Aug., 1957, coll. A. Concepcion, 1 ♀, Atimonan, Quezon, Aug., 1963, coll. A. Concepcion (BPIM); 1 ♀, Abatan, Buguias, Mountain Prov., 60 km S of Bontoc, 1800—2000 m, 9 June, 1964, coll. H. M. Torrevillas (BISH).

Mindanao: 1 ♂, Agusan, Los Arcos, 19—23 Nov., 1959, Malaise trap, coll. L. Quate and C. Yoshimoto (BISH).

In the male from Los Baños the first recurrent vein of the fore wings ends distinctly in the first cubital cell. This proves again that the course of the recurrent veins may be variable and therefore is not a reliable character for identification.

The anterior oblique suture is nearly simple, the widened upper part is smooth and shining.

Group of *Psenulus pulcherrimus*

Psenulus pulcherrimus projectus Van Lith

1962, Van Lith, Zool. Verh. Leiden 52: 102-103 (Java, Krakatau).
1969, Van Lith, Tijdschr. v. Ent. 112: 200 (Kangean I.).

New record: 1 ♀, W Java, Tjipanas, 5—10.000 ft, 8 Sept., 1965, coll. J. E. Lukavsky (CNC).

Psenulus xanthognathus xanthognathus Rohwer

1910, Rohwer, Proc. U.S. Nat. Mus. 37: 660, ♂ (*Psenulus* (*Neofoxia*) *xanthognathus*; Luzon).
1962, Van Lith, Zool. Verh. Leiden 52: 104-107, partim (*Psenulus carinifrons xanthognathus*).
1966, Van Lith, Tijdschr. v. Ent. 109: 44-45, partim (*Psenulus carinifrons xanthognathus*).
1969, Van Lith, Tijdschr. v. Ent. 112: 206 (*Psenulus xanthognathus xanthognathus*).

New record: 1 ♂, Luzon, Sierra Madre, Nuevacija, March, 1965, coll. A. Villareal (CNC).

Psenulus xanthognathus centralis Van Lith

1969, Van Lith, Tijdschr. v. Ent. 112: 207-208 (SE Luzon, Masbate, Leyte, Panay, Busuanga).

Culion: 1 ♀, 6 km W of Culion, 6—7 June, 1962, low vegetation, coll. H. Holtmann (BISH).

This is the first record from the Philippine island Culion. From Busuanga I., north of Culion, four males, no females, are known.

Basal half of fore and mid femora black-brown, as in form "B" from Palawan and Mindanao, but yellow marking on pronotum, scutellum and metanotum not reduced. Apical third of hind tibiae, when seen from aside, black.

List of Palaearctic, Indo-Australian and W Pacific *Psenulus* species

In this list also the Palaearctic species have been divided tentatively into groups. The following species have not been included, as their systematic place is still unclear:

P. taihorinus Strand, 1915 — Formosa
P. clavatus (Cameron, 1890) — India
P. montanus (Cameron, 1907) — India
P. puncticeps (Cameron, 1907) — India

I have not yet examined the latter three species; *P. montanus* is probably very close to *P. atratus*, *P. puncticeps* may be near to *P. antennatus*.

Genus *Psenulus* Kohl

Group of *fuscipennis*

fuscipennis (Dahlbom, 1845), ♀ ♂ — Europe, Turkey, Siberia, Korea,
fuscipennis japonicus Tsuneki, 1959, ♀ ♂ Japan
atratus (Fabr., 1804), ♀ ♂ — Europe, Turkey, Morocco, Syria, Siberia
atratus puncticeps Gussakovskij, 1932, ♀ ♂ — Europe, Siberia, China, Korea, Japan
atratus yamatonis Tsuneki, 1959, ♀ ♂ — Japan
brevitarsis Merisuo, 1937, ♂ ♀ — Europe
laevis Gussakovskij, 1930, ♀ ♂ — Asia
meridionalis de Beaumont, 1961, ♀ ♂ — S Europe, Crete, Turkey, Irak
pan de Beaumont, 1967, ♀ ♂ — SW Asia (Turkey)
tanakai Tsuneki, 1959, ♀ ♂ — Japan
bisicatus spec. nov., ♀ ♂ — W Pakistan

Group of *berlandi*

berlandi de Beaumont, 1937, ♀ — Europe

Group of *concolor*

concolor (Dahlbom, 1845), ♀ ♂ — Europe, Turkey, Japan
schencki Tournier, 1889, ♀ ♂ — Europe, Turkey
lubricus (Pérez, 1905), ♀ ♂ — Japan
maculipes Tsuneki, 1959, ♀ ♂ — Japan
nipponensis Yasumatsu, 1942, ♀ — Korea, Japan

Group of *laevigatus*

laevigatus Schenck, 1857, ♀ ♂ — Europe
fuscipes Tsuneki, 1959, ♀ ♂ — Japan

Group of *nikkoensis*

nikkoensis Tsuneki, 1959, ♀ ♂ — Japan

Group of *anomoneurae* (genus *Nipponopsen* Yasumatsu, 1938)

anomoneurae (Yasumatsu, 1938), ♀ ♂ — Japan
(syn. *Psenulus mandibularis* Tsuneki, 1959)

Group of *suifuensis*

suifuensis spec. nov., ♀ — China

Group of *formosicola*

formosicola Strand, 1915, ♀ ♂ — Formosa

Group of *compactus*

compactus Van Lith, 1962, ♀ — Sumatra

Group of *rufobalteatus*

rufobalteatus Cameron, 1904, ♀ — N India (Assam)
bicinctus Turner, 1912, ♀ ♂ — N India (Assam, Sikkim), Nepal

Group of *scutatus*

scutatus scutatus (Rohwer, 1921), ♀ ♂ — Luzon, Samar, Negros
scutatus sibuyanensis Van Lith, 1962, ♂ — Sibuyan
scutatus mindanaoensis (Rohwer, 1923), ♀ — Mindanao
scutatus borneensis (Rohwer, 1923), ♀ — Borneo
hemicyclius Van Lith, 1962, ♀ ♂ — Palawan
baltazarae baltazarae Van Lith, 1962, ♀ — Luzon
baltazarae luteus Van Lith, 1962, ♀ — Sibuyan
maai Van Lith, 1967, ♂ — Borneo
dentatus Van Lith, 1962, ♀ — Java

Group of *rugosus*

rugosus Van Lith, 1962, ♀ — Mindanao
yoshimotoi yoshimotoi Van Lith, 1969, ♀ — Borneo
yoshimotoi pontilis Van Lith, 1970, ♀ — Tawi Tawi

Group of *quadridentatus*

quadridentatus quadridentatus Van Lith, 1962, ♀ ♂ — Malaya, Vietnam
quadridentatus formosanus Tsuneki, 1966, ♂ — Formosa
separatus Van Lith, 1962, ♀ — Java, Borneo
pendleburyi Van Lith, 1962, ♀ — Borneo
macrodentatus Van Lith, 1962, ♀ — Sumatra
parvidentatus spec. nov., ♀ — Formosa

Group of *nasicornis*

nasicornis spec. nov., ♀ — Celebes

Group of *antennatus*

antennatus (Rohwer, 1923), ♀ ♂ — Malaya, Singapore, Java, Bali
penangensis (Rohwer, 1923), ♀ — Malaya
mauritii Van Lith, 1969, ♀ — Malaya
bengalensis spec. nov., ♂ — India (Bengal)
nietneri spec. nov., ♀ — Ceylon
noonadanius Van Lith, 1970, ♀ ♂ — Balabac, Palawan

Group of *singularis*

singularis Van Lith, 1962, ♀ — Luzon

Group of *erraticus*

erraticus erraticus (Smith, 1861), ♀ — Celebes
erraticus basilanensis (Rohwer, 1921), ♀ ♂ — Singapore, Vietnam, Borneo, Tawi Tawi, Basilan
erraticus butuanensis Van Lith, 1962, ♂ — Mindanao

Group of *crabroniformis*

crabroniformis crabroniformis (Smith, 1858), ♀ ♂ — Borneo, Thailand
crabroniformis sumatranus (Ritsema, 1880), ♀ — Sumatra, Java
crabroniformis subsp. ?, ♀ — Busuanga
philippinensis philippinensis (Rohwer, 1921), ♀ — Luzon
philippinensis dapitanensis (Rohwer, 1923), ♀ — Mindanao, Bohol

Group of *tuberculifrons*

tuberculifrons tuberculifrons (Rohwer, 1921), ♀ — Luzon
tuberculifrons decoratus Van Lith, 1962, ♀ — Sibuyan
maurus (Rohwer, 1921), ♂ — Luzon
suluensis Van Lith, 1970, ♀ ♂ — Tawi Tawi
cavifrons Van Lith, 1962, ♀ — Samar, Mindanao
maculatus maculatus Van Lith, 1962, ♀ — Malaya
maculatus javanensis Van Lith, 1962, ♀ ♂ — Java

Group of *nigrolineatus*

nigrolineatus nigrolineatus (Cameron, 1907), ♀ ♂ — Malaya, Borneo
nigrolineatus ajax (Rohwer, 1921), ♀ — Luzon
nigrolineatus flavicornis Van Lith, 1962, ♀ — Sibuyan
nigrolineatus dubius Van Lith, 1962, ♀ — Mindanao, ? Tawi Tawi
nigrolineatus sulphureus Van Lith, 1962, ♀ — Sumatra
diversus Van Lith, 1962, ♀ — Singapore, Vietnam

Group of *luteopictus*

luteopictus luteopictus (Rohwer, 1921), ♀ ♂ — Luzon, Negros
luteopictus calapanensis Van Lith, 1962, ♀ — Mindoro

Group of *sandakanensis*

sandakanensis (Rohwer, 1923), ♀ ♂ — Borneo, ? Sumatra
filicornis (Rohwer, 1923), ♂ — Basilan
ajaxellus (Rohwer, 1923), ♂ — Mindanao
trimaculatus Van Lith, 1962, ♂ — Malaya
pagdeni Van Lith, 1962, ♀ — Malaya, Borneo

Group of *esuchus*

esuchus (Rohwer, 1923), ♀ ♂ — Borneo, Balabac
corporaali Van Lith, 1962, ♀ — Sumatra
varius Van Lith, 1962, ♀ ♂ — Malaya
pallidicollis spec. nov., ♀ — Borneo
neptunus spec. nov., ♀ — Celebes

Group of *pseudajax*

pseudajax pseudajax Van Lith, 1962, ♂ — Java
pseudajax holtmanni subspec. nov., ♂ — Culion, Busuanga

Group of *interstitialis*

interstitialis interstitialis Cameron, 1906, ♀ ♂ — New Guinea
interstitialis lutescens (Turner, 1907), ♀ — NE Australia
interstitialis salomonensis subspec. nov., ♀ ♂ — Solomon Is.
chariis spec. nov., ♀ — Solomon Is.
araucarius spec. nov., ♀ — New Guinea
segrex spec. nov., ♀ — Celebes
luzonensis luzonensis (Rohwer, 1921), ♀ ♂ — Luzon, Biliran, Negros, Tawi Tawi, Mindanao
luzonensis pseudolineatus Van Lith, 1962, ♂ — Palawan, Balabac
luzonensis davanus (Rohwer, 1923), ♀ ♂ — Mindanao, Mindoro, Balabac
luzonensis baliensis Van Lith, 1962, ♀ — Bali
nigromaculatus (Cameron, 1907), ♀ — Borneo
multipictus (Rohwer, 1921), ♀ — Luzon
tristis Van Lith, 1962, ♂ — Palawan
ornatus (Ritsema, 1876), ♂ — Java
elegans Van Lith, 1962, ♂ — Java
lamprus spec. nov., ♀ — Celebes
peterseni Van Lith, 1970, ♀ — Tawi Tawi
continentis Van Lith, 1962, ♀ — Malaya
annamensis spec. nov., ♀ — Vietnam
hoozanius spec. nov., ♂ — Formosa
ceylonicus spec. nov., ♀ — Ceylon
bakeri bakeri (Rohwer, 1921), ♀ ♂ — Luzon, Mindanao, Samar
bakeri boholensis Van Lith, 1962, ♀ — Bohol
bakeri canlaonensis Van Lith, 1962, ♀ — Negros

Group of *pulcherrimus*

pulcherrimus pulcherrimus (Bingham, 1896), ♀ ♂ — Tenasserim, Vietnam
pulcherrimus eburneus Van Lith, 1969, ♀ — N India (Bengal)
pulcherrimus projectus Van Lith, 1962, ♀ ♂ — Java, Krakatau, Kangean Is.
xanthonotus Van Lith, 1969, ♀ — Formosa
melanonotus Van Lith, 1969, ♂ — Sumbawa
carinifrons carinifrons (Cameron, 1902), ♂ — N India
carinifrons scutellatus Turner, 1912, ♀ ♂ — NE Australia, Papua, Ambon, Buru, Mindanao
carinifrons rohweri Van Lith, 1962, ♀ ♂ — Java, Kangean Is., Luzon, Formosa
carinifrons malayanus Van Lith, 1969, ♀ ♂ — Malaya, Singapore, Vietnam, Sumatra, Borneo
carinifrons bismarckensis Van Lith, 1970, ♀ — Bismarck Is.
carinifrons subsp. ?, ♂ — S India
extremus Van Lith, 1966, ♀ ♂ — New Guinea
sinclairi Lal, 1939, ♂ — India (Bombay)
sogatophagus Pagden, 1933, ♀ ♂ — Malaya, Thailand, ? India (Assam)
xanthognathus xanthognathus (Rohwer, 1910), ♀ ♂ — Luzon
xanthognathus centralis Van Lith, 1969, ♀ ♂ — SE Luzon, Masbate, Samar, Leyte, Cebu, Panay, Busuanga, Balabac, Culion
xanthognathus centralis form A, ♀ ♂ — Negros, Sibuyan
xanthognathus centralis form B, ♀ ♂ — Palawan, Mindanao
iwatai Gussakovskij, 1934, ♀ ♂ — Japan
(subgenus *Eopsenulus* Gussakovskij, 1934)

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INDEX

The names of new species and subspecies are marked with an asterisk.

ajax
anomoneurae
* annamensis
antennatus
* araucarius
atratus

bakeri
baltazarae
basilanensis
* bengalensis
bicinctus
* bisicatus

carinifrons
cavifrons
centralis
* ceylonicus
* chariis
clavatus
concolor
corporaali
crabroniformis

davanus
Diodontus
diversus

elegans
Eopsenulus
erraticus
esuchus

formosanus

* holtmanni
* hoozanius

interstitialis
iwatai

laevis
* lamprus
luteopictus
lutescens
luteus
luzonensis

macrodentatus
mandibularis
Mellinus
meridionalis
montanus

* nasicornis
Neofoxia
* neptunus
* nietneri
nigrolineatus
Nipponopsen

pagdeni
* pallidicollis
pan
* parvidentatus
penangensis
peterseni
projectus
Psen
pseudajax
pseudolineatus
pulcherrimus
puncticeps

quadridentatus

rufiventris
rufoannulatus
rufobalteatus

* salomonensis
sandakanensis
scutatus
* segrex
separatus
* suifuensis
suluensis
sumatranus

taihorinus
tuberculifrons

varius

xanthognathus

(The names mentioned only in the review of species occurring in the Palaearctic, Indo-Australian and W Pacific regions have not been included in this index).

Postscript. After sending the present article to the printers', I received Professor K. Tsuneki's paper "Studies on the Formosan Sphecidae (XIII). A Supplement to the subfamily Pemphredoninae (Hym.) with a key to the Formosan species", Etizenia 57: 1—21, dated October 25, 1971.

Tsuneki considers not only *kankauensis* Strand, 1915, from Formosa, a subspecies of *P. ornatus* Ritsema, but also *P. tristis* Van Lith, from Palawan, and *P. elegans* Van Lith, from Java. He further describes a new subspecies from Formosa, *P. ornatus pempuchiensis*. Unfortunately of all these forms the females, which often show more differentation, are unknown.